REPORT OF THE CHIEF OF THE BUREAU OF PUBLIC ROADS, 1938

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF PUBLIC ROADS,
Washington, D. C., September 15, 1938.

Hon. HENRY A. WALLACE,
Secretary of Agriculture.

DEAR MR. SECRETARY: I submit herewith the report of the Bureau of Public Roads for the fiscal year ended June 30, 1938.

Sincerely yours,

THOMAS H. MACDONALD, *Chief.*

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INTRODUCTION

Highway construction of all types administered by the Bureau during the year resulted in the improvement of 15,345 miles, the elimination of 711 grade crossings, reconstruction of 144 obsolete grade-crossing structures, and protection of 744 highway-railroad crossings by signs and signals. Both the amount of work done per mile of improvement, and the total mileage improved, have considerably exceeded the average rates over the past 10 years.

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This year marks the initiation of Federal aid for secondary or farm-to-market roads and grants of funds for highway-railroad grade-crossing elimination as parts of the regular Federal highway program. These classes of work were begun in the emergency program to relieve unemployment and were included in the regular program by the act of June 16, 1936, which authorized $25,000,000 for secondary roads, to be matched by the States, and a grant of $50,000,000 to pay the full cost of constructing grade-crossing eliminations.

The greater part of the work administered by the Bureau was carried on in cooperation with and under the immediate supervision of the State highway departments. In this way, improvements were completed on 9,333 miles of the rural portion of the Federal-aid highway system, 2,037 miles of secondary or feeder roads, and 760 miles of roads and streets in municipalities. Improvements in Federally controlled areas, reconstruction of flooded-damaged roads, and construction of roads with funds allotted by other Federal agencies aggregated 3,215 miles.

MODERNIZATION OF FEDERAL-AID SYSTEM NOW MOST IMPORTANT FEATURE OF FEDERAL-AID PROGRAM

The system of main highways in the United States is by far the most extensive of any in the world. Only the most out-of-the-way places cannot now be reached over a surfaced road. Many miles of main highways are broad, direct routes over which vehicles can travel continuously at the touring speed selected by the driver without the need for slowing down because of sharp curves, steep grades, or other obstacles and there is frequent opportunity to pass overtaken vehicles. However, there is a large mileage of roads that cannot be traveled with such facility and ease; roads on which the driver must accommodate himself to conditions that are definitely inferior to present-day standards.

This is a condition that has been unavoidable and that is being corrected as rapidly as the necessary funds can be obtained. When the States and the Federal Government began the improvement of highways the network connecting our cities was largely unimproved. These roads had been planned for horse-drawn vehicles and the pioneer automobilists made few long trips over them. That such a large part of the network of main highways can now be traveled with ease and comfort is due to the intelligent, long-time distribution of annually limited funds over a selected system. A degree of improvement was effected, which, though generally recognized as less than that which would ultimately be necessary, was still sufficient to serve the immediate need. As the need for further improvement of various sections has become evident it has been met as promptly and as fully as was consistent with the early completion of a desirable minimum improvement of the system as a whole. This policy, sometimes called stage construction, is the only one under which the Federal-aid system and the more extensive State systems could have been improved in a short space of time to a general condition which permits their present use by a traffic of 150 billion vehicle-miles annually.

There are few sections of the Nation's network of main highways that have not been initially, if inadequately, improved. State and Federal appropriations, in large part, are now being devoted to supplementary improvements on the less adequate sections.

Many of our most used and important roads are among those that must now be classed as very inadequately improved. These are the roads that were first recognized as of outstanding importance and as such were first improved with surfaces of the highest type designed according to the standards of early road builders. There was general acceptance of these standards as sufficiently advanced—in fact, there was much opposition on the grounds that they were too advanced. The great increase in highway use and the recent marked increase in vehicle speed have forced the adoption of much higher standards.

GREATEST NEEDS ON MAIN ROADS ARE WIDENING, LONGER SIGHT DISTANCES, AND REDUCTION OF CURVATURE

Eliminating those curves that have become traffic hazards at the now normal driving speed and increasing sight distances by road straightening and by grading at the tops of hills are widespread needs on the existing main highways. These defects are found generally on roads in every part of the country and their danger to traffic is the consequence of an increase in vehicle speed far beyond what was visioned 15 or 20 years ago and far in excess of the legal limitations that existed in most States.

Greater surfaced width of road is of equal importance. There has always been the pressure to stretch highway funds beyond their limit to improve as many miles as possible. Surfaced width has been sacrificed for surfaced length. First 12- and 14-foot road surfaces were built, then widths were increased to 16 feet, and later to 18 feet, and for some years 20 feet has been the standard width for two-lane roads. The Federal Highway Act of 1921 demanded no greater width than 18 feet. Many of the older roads have been widened to this standard, generally as a part of a resurfacing operation. Here the wisdom of the stage-construction policy has been conspicuously demonstrated. The initial surfacing has caused a flow of traffic on the road with a corresponding flow of motor revenues for highways that is being used, in considerable part to remedy inadequate conditions. While many roads have been widened there is still much of this work to be done. The cost per mile of such work is not great unless it is accompanied by other improvements.

Within the last few years there has been a pronounced and desirable trend toward surfacing two-lane highways to widths greater than 20 feet to accommodate the greater volume of traffic moving at higher speeds. While many new surfaces are now being constructed 22 feet wide, a surfaced width of 24 feet will soon come to be generally recognized as a desirable standard for important two-lane highways.

Heavy expense for road widening only is not incurred until the traffic volume is so great that it cannot be accommodated safely by two traffic lanes. Provision of a third lane is sometimes resorted to and while this expedient involves only a moderate expense, it is not a satisfactory solution of traffic-congestion problems.

For great volumes of traffic, such as flow on the main highways adjacent to large cities and between some of the larger cities that are close together, the multiple-lane highway is the only satisfactory solution. Experience with the first four-lane roads quickly resulted in the almost unanimous conclusion that traffic flowing in opposite directions must be separated by a dividing strip of some sort if a heavy accident toll is to be avoided.

Divided four-lane roads are relatively expensive. They are necessary where population is dense and right-of-way costs are therefore high. The central strip or grass plot dividing the highway adds further to the cost. In the future, provision for pedestrians and other services must be made along these highways and will add still further to the cost.

While the cost of properly designed four-lane roads is high, the needed expenditures in this direction do not overshadow those needed for the other purposes that have been described. Highway-planning surveys being conducted in cooperation with 46 States are resulting in an accurate picture of the flow of traffic on the main highways. These data indicate that there is not a very large mileage of highways on which four or more traffic lanes are required for the reasonable accommodation of present traffic from the standpoint of total vehicles moving. There now exists more than 3,400 miles of such width, but on the greater portion of this mileage there is no provision for the physical separation of traffic moving in opposite directions. The normal increase of traffic will add to the need for four-lane highways and a considerable portion of the existing undivided four-lane highways must be further improved so as to accomplish a separation of opposing traffic lanes. It is evident, therefore, that the provision of facilities of this general class is lagging very far behind actual needs.

CONSTRUCTION OF SECONDARY OR FARM-TO-MARKET ROADS

Since the Federal Government first undertook the construction of secondary or farm-to-market roads in the emergency program initiated in 1933, there has been completed under Bureau supervision more than 31,000 miles of such road. This is considerably in excess of the Federal-aid roads constructed in the first 7 years of operation of the Federal-aid plan.

Employment of labor was the immediate objective of the emergency program and to this end projects for improvement were selected without delay. The selection was not a particularly difficult problem with so many much-used secondary roads demanding improvement but more careful selection of these highways is necessary if they are to give the greatest service. Improvement of secondary roads as part of the regular Federal-aid program, begun in the past year, has supplied the opportunity to undertake the planning of a connected system and methods of financing a continuing program.

The highway-planning surveys, described on page 64, have as one of their most important objectives the supplying of all data needed in designating those secondary roads to be improved immediately and in annual programs to follow with definite provision for meeting all necessary costs.

The rural highway program of the future should be directed along two principal lines: (1) The maintenance and needed enlargement of the serviceability of the main highways, and (2) the extension of reasonable improvement to those secondary and feeder roads that directly contribute to the permanent use of rural lands. There is a close relation between these classes of roads both in usage and in the sources from which funds are drawn for their support. Expenditures made for one class will necessarily affect the amounts that can be made available for the other class. It is therefore of the greatest importance that the relative needs of each class be determined with all possible accuracy and that improvement of each class be planned with full consideration of these facts. Any other course must inevitably lead to unbalanced programs and economic loss resulting from inadequate highway service. The highway-planning surveys are producing the needed facts and the Bureau is cooperating with the States in developing highway programs, giving full attention to the designation of secondary road systems.

HIGHWAY SAFETY

The safety of highway users is a first responsibility with all who plan and build the highways. Defects in the existing system are fully recognized and the speed with which they will be corrected depends primarily on the rate at which funds can be made available for the purpose. The program of highway modernization, including road straightening and widening, increasing sight distances, grade-crossing elimination, and construction of service roads and sidewalks should go forward with all possible speed. At the same time it must be realized that accomplishment of all these things will not constitute a solution of the accident problem. The present condition of the main highways is not conducive to accidents except when rendered so by risk-taking drivers. The data available on the causes of accidents indicate that improper acts by vehicle drivers are the element common to most accidents. The number of accidents and deaths can be materially lessened only by centering the attack on driving habits and a proper selection of drivers. Education and persuasion are being widely used and are well worth while but many of the most dangerous drivers will respond only to more positive measures.

A careful and detailed study of all available data on highway accidents has been made by the Bureau with the aid of experts in traffic control and law enforcement. There resulted a number of findings some of which are immediately useful in accident prevention and others point the way in further studies. Despite the availability of the vehicle code recommended by the National Conference on Street and Highway Safety there is still great lack of uniformity in essential features of State motor-vehicle and highway laws. There is undesirable variation in methods of recording and analyzing accident data. Accidents do not ordinarily result from single causes but from combinations of contributing causes. There is a relatively small group of definitely accident-prone drivers who experience a relatively large number of accidents. Drivers of 16 to 25 years in age have more than their share of accidents. Disciplining and control of delinquent drivers are in many instances, strikingly deficient. Highway police organizations are usually so small and so occupied with other duties as to be unable to operate effectively in motor-vehicle law enforcement and accident prevention. There are many improperly adjusted or inadequately maintained motor vehicles.

Improvement of the present situation will require concerted action by the numerous agencies concerned with traffic control and law enforcement. Immediate action should be taken toward the adoption by the States of the uniform motor-vehicle code recommended by the National Conference on Street and Highway Safety. There is urgent need for uniformity in speed laws, stopping and turning regulations, and other phases of traffic control. All States should provide for rigid examination of applicants for drivers' licenses. Motor vehicles should be inspected at regular intervals to insure that those poorly equipped and defective are kept off the road.

Expanded patrol forces are required for the enforcement of traffic laws; and violators, when arrested and convicted, must be punished without fear or favor. Mandatory revocation of the driving license should follow the more serious violations and the repetition of violation. Other steps to be taken include the skilled investigation of traffic accidents, the establishment of a uniform system of compulsory accident reporting, a national program of safety education, and a

highway-improvement program designed to eliminate as rapidly as possible all recognized dangerous conditions.

FEASIBILITY OF SUPERHIGHWAYS TO BE STUDIED AND REPORTED

There has been wide public interest in the creation of a system of multiple-lane highways, built according to the highest standards of grade and alinement, with opposing traffic separated by a center parkway, bypassing all cities, with structures separating streams of traffic at all highway and rail crossings, and with access from side roads permitted only at carefully selected points. The large volumes of traffic that flow between densely populated areas, when not too widely separated, in many instances appear to justify the high cost of such improvement.

The Bureau is now making studies that should indicate rather definitely the need for such highways and the extent to which they may be expected to be self-supporting. The Federal-aid Highway Act of 1938 directs the Bureau to investigate the feasibility of building and the cost of superhighways, not exceeding three in number, running in a general direction from the eastern to the western portion of the United States, and not exceeding three in number, running in a general direction from the northern to the southern portion of the United States, including the feasibility of a toll system on such roads. A report is to be made to Congress not later than February 1, 1939.

The highway-planning surveys conducted by the Bureau in cooperation with 46 States are yielding data on the flow of traffic on the main highways of the Nation and the extent to which this traffic is a through movement and might be concentrated on special-service highways. The problem is one of determining the number of highway users that might be expected where tolls are charged and whether the expected revenue would support the cost of the highways.

SOURCES OF FUNDS USED DURING THE FISCAL YEAR

In contrast with the preceding year when emergency highway and grade-crossing appropriations supplied the larger part of the funds available, the fiscal year 1938 marked an almost complete return to work supported by annual Federal-aid authorizations. The apportionment for the fiscal year was $125,000,000 for improvement of the Federal-aid system, $25,000,000 for secondary or farm-to-market roads, and $50,000,000 for elimination of hazards at highway-railroad grade crossings. The States were required to match the first two of these funds but the grade-crossing funds were available to pay the full construction cost. The apportionment by States was shown in the last annual report.

The year began with $293,739,309 available for programmed projects that had not been advanced to the contract stage. Of this amount $33,189,957 was the remainder of the emergency funds provided to furnish employment through highway improvement.

On December 31, 1937, the $200,000,000 authorized for the fiscal year 1939 was apportioned to the States after first deducting $5,000,000 for administrative expenses of the Bureau as authorized by law. The apportionment is shown in able 1.

TABLE 1.—*Apportionments of Federal aid for the fiscal year 1939 for roads on the Federal-aid highway system, for secondary or feeder roads, and for grade-crossing eliminations*

State	Federal-aid system	Secondary or feeder	Grade crossings	Total
Alabama	$2,600,165	$520,033	$986,449	$4,106,647
Arizona	1,785,984	357,197	315,619	2,458,800
Arkansas	2,132,790	426,558	865,366	3,424,714
California	4,735,268	947,054	1,825,553	7,507,875
Colorado	2,271,785	454,357	632,565	3,358,707
Connecticut	785,963	157,193	417,706	1,360,862
Delaware	609,375	121,875	243,750	975,000
Florida	1,669,497	333,899	692,981	2,696,377
Georgia	3,154,850	630,970	1,194,288	4,980,108
Idaho	1,538,178	307,636	404,755	2,250,569
Illinois	5,095,276	1,019,055	2,579,163	8,693,494
Indiana	3,063,178	612,636	1,270,383	4,946,197
Iowa	3,200,927	640,185	1,362,859	5,203,971
Kansas	3,283,179	656,636	1,271,424	5,211,239
Kentucky	2,299,072	459,814	894,871	3,653,757

TABLE 1.—*Apportionments of Federal aid for the fiscal year 1939 for roads on the Federal-aid highway system, for secondary or feeder roads, and for grade-crossing eliminations*—Continued

State	Federal-aid system	Secondary or feeder	Grade crossings	Total
Louisiana	$1,791,188	$358,238	$777,845	$2,927,271
Maine	1,089,359	217,872	338,735	1,645,966
Maryland	1,018,447	203,689	506,840	1,728,976
Massachusetts	1,725,964	345,193	1,021,971	3,093,128
Michigan	3,784,165	756,833	1,620,378	6,161,376
Minnesota	3,402,720	680,544	1,313,891	5,397,155
Mississippi	2,196,926	439,385	777,444	3,413,755
Missouri	3,774,930	754,986	1,496,333	6,026,249
Montana	2,553,444	510,689	653,267	3,717,400
Nebraska	2,579,115	515,823	871,434	3,966,372
Nevada	1,590,172	318,034	243,750	2,151,956
New Hampshire	609,375	121,875	243,750	975,000
New Jersey	1,662,041	332,408	972,568	2,967,017
New Mexico	1,993,177	398,635	419,200	2,811,012
New York	6,105,009	1,221,002	3,345,530	10,671,541
North Carolina	2,919,413	583,883	1,242,912	4,746,208
North Dakota	1,939,847	387,969	776,153	3,103,969
Ohio	4,517,858	903,572	2,087,464	7,508,894
Oklahoma	2,928,955	585,791	1,125,334	4,640,080
Oregon	2,048,413	409,683	565,844	3,023,940
Pennsylvania	5,291,737	1,058,347	2,826,864	9,176,948
Rhode Island	609,375	121,875	243,750	975,000
South Carolina	1,671,209	334,242	736,174	2,741,625
South Dakota	2,029,328	405,866	674,361	3,109,555
Tennessee	2,616,339	523,268	933,280	4,072,887
Texas	7,787,739	1,557,548	2,674,043	12,019,330
Utah	1,410,802	282,160	321,103	2,014,065
Vermont	609,375	121,875	243,750	975,000
Virginia	2,269,875	453,975	935,084	3,658,934
Washington	1,956,342	391,268	750,582	3,098,192
West Virginia	1,357,927	271,585	652,386	2,281,898
Wisconsin	3,030,337	606,067	1,220,638	4,857,042
Wyoming	1,559,860	311,972	331,769	2,203,601
District of Columbia			243,750	243,750
Hawaii	609,375	121,875	243,750	975,000
Puerto Rico	609,375	121,875	360,341	1,091,591
Total	121,875,000	24,375,000	48,750,000	195,000,000

EMPLOYMENT ON ROAD WORK

Employment on highway work with Federal funds administered by the Bureau declined from 1,792,760 man-months in the fiscal year 1937 to 1,262,202 man-months in the past year. This was a direct result of the near exhaustion of the various special funds appropriated in previous years to provide employment. Employment provided by the emergency funds apportioned to all States dropped from 1,009,323 man-months in 1937 to 273,696 man-months in 1938. This was partly offset by an increase in the employment on regular Federal-aid highway and grade-crossing work which amounted to 538,579 man-months in 1937 and 778,488 man-months in 1938. Table 2 shows the employment in each of the fiscal years 1932 through 1938 by months. Table 3 shows the employment furnished in 1938 on each class of work administered by the Bureau and on State work done without Federal assistance.

TABLE 2.—*Comparison of employment during the fiscal years 1932–38 on all Federal and Federal-aid highway construction and on all Federal and State road work, including State maintenance, by months*

Month	Men employed on all Federal and Federal-aid highway construction							Total men employed on all Federal and State highway construction and maintenance						
	1932	1933	1934	1935	1936	1937	1938	1932	1933	1934	1935	1936	1937	1938
July	164,708	81,042	129,205	335,223	191,041	249,271	159,489	385,349	305,372	332,277	549,203	375,442	435,971	334,536
August	151,418	89,346	111,211	297,224	178,756	247,841	163,331	389,949	333,403	329,813	531,034	382,846	433,533	351,853
September	116,100	122,193	115,047	247,880	143,455	227,916	152,784	356,617	374,405	337,973	498,151	340,073	414,147	346,444
October	88,869	124,106	154,016	210,079	135,660	206,113	143,617	330,104	373,246	384,029	450,322	323,374	389,966	330,942
November	62,466	129,933	185,860	201,046	118,898	172,295	121,394	289,316	371,667	420,069	426,603	290,523	353,971	314,067
December	35,991	98,271	174,358	147,101	103,493	128,314	85,365	244,971	290,465	362,031	323,700	252,229	288,248	255,530
January	29,518	75,498	154,154	96,594	82,731	76,829	54,899	229,189	266,443	315,989	240,414	202,884	210,027	196,858
February	26,673	78,215	156,814	81,257	70,418	57,844	49,713	218,218	255,256	306,090	221,406	200,451	190,336	177,675
March	28,008	95,704	144,053	90,999	86,050	69,946	51,229	211,549	279,213	296,265	217,539	227,586	200,794	179,420
April	42,205	122,256	187,657	123,063	132,834	88,361	67,829	245,843	299,882	345,278	282,740	287,478	226,286	213,802
May	59,008	139,831	271,972	167,535	193,269	122,655	98,179	259,615	330,138	466,504	331,000	374,191	299,063	272,316
June	71,772	152,276	336,414	193,263	237,330	145,375	114,373	280,636	359,605	545,013	362,339	423,466	313,149	294,240
Total (man-months)	876,736	1,308,671	2,120,761	2,191,264	1,673,935	1,792,760	1,262,202	3,441,356	3,839,095	4,441,331	4,434,451	3,680,543	3,755,491	3,267,683

TABLE 3.—*Direct job employment during the fiscal year 1938 on the several classes of Federal and Federal-aid road construction administered by the Bureau of Public Roads and State road construction and maintenance*

Month	Men employed on road construction										Men employed on road maintenance by State highway departments	Total men employed
	In whole or in part with Federal funds									With State funds only, on State highways		
	National-forest highways	National-park highways	Public-lands highways	Federal-aid highways and grade-crossing eliminations	Public Works highways	Works Program highways	Works Program grade-crossing eliminations	Loan-and-grant highways [1]	National work-relief highways			
July	2,055	4,674	180	84,604	3,761	23,215	21,456	14,861	4,683	25,140	149,907	334,536
August	2,949	4,987	299	90,905	3,974	20,222	19,268	16,612	4,115	28,379	160,143	351,853
September	3,574	4,403	348	88,792	3,068	17,712	17,112	14,058	3,717	26,632	167,028	346,444
October	3,715	3,680	354	86,058	2,466	15,623	15,491	13,032	3,198	27,280	160,045	330,942
November	3,161	2,344	310	74,522	2,019	12,333	12,810	10,761	3,134	29,491	163,182	314,067
December	1,477	1,552	334	50,622	1,489	8,112	9,512	9,034	3,233	23,825	146,340	255,530
January	695	824	251	32,074	1,141	4,427	6,175	6,314	2,998	15,394	126,565	196,858
February	340	826	225	30,806	1,083	3,265	4,812	5,117	3,239	12,252	115,710	177,675
March	258	983	206	33,295	1,053	3,048	4,164	4,673	3,549	11,379	116,812	179,420
April	516	1,351	237	47,225	1,242	3,917	4,628	5,308	3,405	14,073	131,900	213,802
May	937	2,315	390	72,378	2,351	4,793	5,353	6,433	3,229	17,674	156,463	272,316
June	1,598	2,782	280	87,207	2,105	4,635	5,861	6,769	3,136	19,875	159,992	294,240
Total (man-months)	21,275	30,721	3,414	778,488	25,752	121,302	126,642	112,972	41,636	251,394	1,754,087	3,267,683

[1] Projects transferred by the Public Works Administration for engineering supervision.

As the Federal highway program passed out of the emergency employment stage and restrictions on contractors regarding employment of labor were no longer applied the employment of individual workers became more continuous and the weekly wage increased.

The total employment for the year on work supervised by the Bureau—1,262,202 man-months—is the equivalent of an average full-time employment each month of 105,180 men. The number of individuals actually employed, some of them on a part-time basis, averaged approximately 145,000 persons per month. Indirect employment in the production and transportation of equipment and materials is estimated at 1.7 times the direct employment for work of the character done during the year, indicating an indirect employment of 2,146,000 man-months, and this, added to the direct employment, gives a full-time employment of 3,408,000 man-months, the equivalent of the full-time continuous employment of 284,000 men.

Employment on State construction financed entirely with State funds and on State maintenance work increased slightly over the employment in the preceding year. Such work is financed almost entirely with State motor-vehicle revenues which furnish an income not subject to marked fluctuations from year to year and the resulting employment is correspondingly uniform.

ADMINISTRATION OF HAYDEN-CARTWRIGHT ACT PENALIZING DIVERSION OF MOTOR-USER REVENUES FROM HIGHWAY PURPOSES

The Hayden-Cartwright Act of 1934 requires that any State that applies to highway purposes a lesser amount of motor-vehicle fees and gasoline taxes than was provided by law on June 18, 1934, shall be penalized not more than one-third of the Federal-aid apportionments to which it would otherwise be entitled.

Administration of this requirement is placed under the Secretary of Agriculture and has necessitated a continuous study of State laws pertaining to disposition of motor-user revenue.

During the past year a careful review of official reports showed that motor-vehicle revenues had been diverted from highway purposes by legislative acts in New Jersey and Massachusetts. A reduction of $250,000 in the Federal-aid funds apportioned to New Jersey for the fiscal year 1937 was made on August 7, 1937. On June 2, 1938, there was withheld from Massachusetts $472,862 of the apportionment to that State for the fiscal year 1938.

In the preceding fiscal year State officials of Georgia were notified that the State had used motor-vehicle revenues for nonhighway purposes to such an extent as to require Federal action. Georgia officials gave assurance that required amounts would be restored to highway funds but satisfactory action has not yet been taken by the State.

FEDERAL-AID LEGISLATION AMENDED AND FUNDS AUTHORIZED FOR 1940 AND 1941

Authorization of Federal-aid funds for the fiscal years 1940 and 1941 and for other road building administered by the Bureau was made by the act of June 8, 1938. The authorizations are as follows:

Item	1940	1941
Federal-aid system	$100,000,000	$115,000,000
Secondary or farm-to-market roads	15,000,000	15,000,000
Elimination of hazards at grade crossings	20,000,000	30,000,000
National-forest roads	10,000,000	13,000,000
National-park roads	4,000,000	5,000,000
Parkways	6,000,000	8,000,000
Public-land roads	1,000,000	2,000,000
Indian roads	2,500,000	3,000,000

The new legislation made the District of Columbia eligible for participation in all regular Federal-aid funds beginning with the fiscal year 1940. Heretofore the District has participated in emergency highway funds and in grade-crossing funds for 1938 and 1939 but not in regular Federal-aid for highways.

Roadside and landscape development, including such sanitary and other facilities as may be deemed reasonably necessary to provide for the suitable accommodation of the public, are now specifically authorized as a part of Federal-

aid work. The purpose of this legislation is to remove any doubt as to the authority for these classes of improvements.

States devoting all motor-vehicle revenues to certain highway purposes and still unable to match Federal-aid funds for 1938 and 1939 may be relieved of matching under a provision of the new act. A State that applies all proceeds of special taxes on motor-vehicle transportation to highway purposes and expends 90 percent of them for administrative and operating expenses of the State highway department, maintenance of Federal-aid and State highways, and payment of interest and principal on highway debts for which such revenues have been pledged, may be relieved of matching Federal-aid funds to the extent that it lacks funds for this purpose.

Near the close of the fiscal year a study was made of the use of motor-vehicle revenue in Arkansas which showed that they were being used in accordance with the above provisions. Shortly after the close of the year the Secretary of Agriculture announced that the State would be relieved of the necessity of matching 1938 and 1939 funds to the extent that State funds were lacking.

MILEAGE OF FEDERAL-AID SYSTEM

The Federal-aid system was designated as a result of the Federal Highway Act of 1921 and in accordance with the intention of the act there has been close adherence to the original system. Only minor revisions have been made to meet unforeseen conditions. The mileages have been changed slightly from year to year as estimated mileages or mileages along old roads have been replaced by the measured mileage on new construction.

The original system was limited to 7 percent of the rural road mileage within each State. When provision has been made for improvement of 90 percent of the designated system an additional 1 percent is permitted and further additions are permitted on the same basis. This provision is becoming of increasing importance and has been taken advantage of by 24 States. During the past year the mileage of the system outside of Federal reservations increased by 2,165 miles due almost entirely to extensions beyond the original 7 percent.

The system in any State may exceed what would otherwise be the limiting mileage by an amount equal to the mileage of the system within Federal reservations. Additions to the system in reservations amounted to 1,320 miles bringing the total additions for the year to 3,485. System mileages by States are shown in table 4.

TABLE 4.—*Designated Federal-aid highway system mileage as of June 30, 1938*

State	Mileage of approved routes outside Federal reservations	Mileage of approved routes within Federal reservations	Total mileage of system	State	Mileage of approved routes outside Federal reservations	Mileage of approved routes within Federal reservations	Total mileage of system
Alabama	3,933		3,933	New Hampshire	968	33	1,001
Arizona [1]	1,617	597	2,214	New Jersey [1]	1,567		1,567
Arkansas	5,029	175	5,204	New Mexico	3,275	377	3,652
California [1]	5,581	555	6,136	New York [1]	9,078	16	9,094
Colorado	3,211	514	3,725	North Carolina [1]	7,080	507	7,587
Connecticut [1]	1,046		1,046	North Dakota	7,139	85	7,224
Delaware [1]	824		824	Ohio [1]	7,109		7,109
Florida [1]	2,479		2,479	Oklahoma	6,474	48	6,522
Georgia	5,654	73	5,727	Oregon [1]	3,272	482	3,754
Idaho	2,549	772	3,321	Pennsylvania [1]	7,656	108	7,764
Illinois [1]	9,004	8	9,012	Rhode Island [1]	518		518
Indiana [1]	5,340		5,340	South Carolina [1]	4,020	196	4,216
Iowa [1]	7,703	2	7,705	South Dakota	5,803	477	6,280
Kansas	8,670	15	8,685	Tennessee	4,566	66	4,632
Kentucky	3,700	6	3,706	Texas [1]	14,174	127	14,301
Louisiana	2,756		2,756	Utah [1]	2,085	146	2,231
Maine	1,617	4	1,621	Vermont	1,036		1,036
Maryland [1]	2,195		2,195	Virginia [1]	4,568	82	4,650
Massachusetts [1]	1,674		1,674	Washington	2,938	404	3,342
Michigan [1]	5,729	233	5,962	West Virginia	2,214	29	2,243
Minnesota	7,174	291	7,465	Wisconsin	5,508	133	5,641
Mississippi	3,699	10	3,709	Wyoming	3,222	337	3,559
Missouri [1]	7,975		7,975	Hawaii	539		539
Montana	4,390	1,058	5,448	Puerto Rico	858		858
Nebraska	5,598	21	5,619				
Nevada [1]	1,760	54	1,814	Total	216,574	8,041	224,615

[1] Increased beyond 7 percent.

STATUS OF MAJOR FUNDS AND PROGRESS IN CONSTRUCTION

During the year 12,129 miles of highway were brought to completion, exclusive of work done in Federal areas and with special funds. The completed work included 9,333 miles on the Federal-aid system outside of municipalities, 559 miles on extensions of the system into and through municipalities, 201 miles of secondary or feeder roads in municipalities, and 2,036 miles of secondary or feeder roads outside of municipalities. Payments to the States for construction completed amounted to $218,637,062, as shown in table 5.

TABLE 5.—*Funds paid to the States during the fiscal year 1938*

State	Federal aid, 1917–33	Public Works, 1934–35	Works Program		Federal-aid system, 1936–39	Federal aid, secondary or feeder	Federal aid, grade crossings	Total
			Highways	Grade-crossings				
Alabama	$20,545	$132,833	$338,184	$444,580	$2,492,584	$40,365	$108,680	$3,577,771
Arizona		23,427	208,265	201,391	2,045,124	67,854	4,718	2,550,779
Arkansas		120,402	263,840	499,473	2,817,299	2,757	56,681	3,760,452
California		439,792	844,199	1,026,711	4,812,670	78,564	310,743	7,512,679
Colorado		22,933	193,478	761,122	1,943,618	66,404	4,000	2,991,555
Connecticut		265,702	693,773	902,485	234,332			2,096,292
Delaware		4,460	140,439		96,548			241,447
Florida		87,623	296,711	421,548	1,305,059	118		2,111,059
Georgia		910,653	2,493,801	1,485,334	2,711,419	21,832		7,623,039
Idaho		20,737	62,011	452,148	1,647,706	147,486	66,501	2,396,589
Illinois		599,152	891,053	3,360,116	6,057,598	127,280	163,800	11,198,999
Indiana		121,449	564,724	756,083	3,054,514		247,503	4,744,273
Iowa		26,910	749,176	1,449,680	3,940,950		472,245	6,638,961
Kansas		48,641	420,035	613,929	2,415,945	7,735	340,425	3,846,710
Kentucky		60,003	653,145	1,348,186	2,245,000	200,471	73,950	4,580,755
Louisiana		143,795	534,562	905,759	610,852			2,194,968
Maine		45,443	192,318	374,695	1,441,875	130,055		2,184,386
Maryland		406,700	550,685	381,090	843,789			2,182,264
Massachusetts	1,000	188,708	1,594,780	1,147,328	1,374,624		6,565	4,313,005
Michigan		103,047	315,332	550,161	3,605,177		518,162	5,091,879
Minnesota		422,254	637,761	1,002,483	3,540,148	50,635	369,268	6,022,549
Mississippi	6,109	226,251	522,771	596,299	2,703,982		64,587	4,119,999
Missouri		196,203	479,641	1,332,948	3,341,211	480,173	74,470	5,904,646
Montana		118,851	448,287	315,070	2,093,763		174,773	3,150,744
Nebraska		136,655	577,107	921,894	2,293,479	78,625	65,568	4,073,328
Nevada		56,964	188,316	78,809	1,877,456	239,895	83,205	2,524,645
New Hampshire		28,482	187,760	211,219	364,406	27,205	3,750	822,822
New Jersey		595,321	512,002	1,505,971	908,823		44,996	3,567,113
New Mexico		96,069	298,711	297,518	2,528,690	27,582	6,484	3,255,054
New York		470,793	1,368,216	3,350,463	7,349,032	439,390	198,811	13,176,705
North Carolina		375,718	844,042	1,073,692	3,326,302	147,736	61,677	5,829,167
North Dakota	8,230	543,115	463,928	981,803	1,597,896		47,222	3,642,194
Ohio	4,480	354,762	1,656,778	3,097,331	3,402,148	15,656		8,531,155
Oklahoma	4,542	270,028	639,448	1,415,769	3,039,910	8,986	16,343	5,395,026
Oregon		164,835	524,207	282,636	2,023,294	54,757	358,821	3,408,560
Pennsylvania		1,613,596	5,102,692	4,221,926	5,381,736	44,127	18,425	16,382,502
Rhode Island			19,460	142,021	689,151	62,008		912,640
South Carolina	7,500	237,583	485,003	788,986	2,178,118	41,049	13,716	3,751,955
South Dakota		267,176	520,159	1,124,436	1,623,124	6,021	63,711	3,604,627
Tennessee		170,166	1,193,831	1,899,771	1,523,227	12,529		4,799,524
Texas	5,501	415,240	715,205	1,137,672	8,058,319	56,500	72,354	10,460,791
Utah		49,074	348,857	265,019	1,205,765	70,407	92,817	2,031,939
Vermont		56,767	143,782	199,622	770,162	69,657	121,001	1,360,991
Virginia	3,078	444,324	406,933	1,196,245	2,413,030	23,749	82,419	4,569,778
Washington		69,657	228,445	577,496	1,953,086	108,418	149,754	3,086,856
West Virginia		254,541	301,248	999,377	867,314	12,971	58,189	2,493,640
Wisconsin		117,245	296,922	939,290	4,535,501	8,246	84,797	5,982,004
Wyoming		83,815	181,759	384,977	1,850,287	142,536	45,693	2,689,067
District of Columbia				32,054			95,905	127,959
Hawaii		93,575	224,813	91,099	367,755			777,242
Puerto Rico					242,730	79,202	22,046	343,978
Total	60,985	11,701,470	31,518,595	47,545,715	119,746,531	3,198,981	4,864,785	218,637,062

Details concerning the status of the various funds by States and by classes of highways are shown in tables 6 to 9. The mileages of highway according to status, by States, and by class of highways are shown in tables 10, 11, and 12. Similar information for grade-crossing work is shown in table 13. Tables 14, 15, and 16 show the mileage by types in the different stages leading up to completion. The tables are so arranged that each shows all funds or all mileage in a given status.

PROGRESS IN PUBLIC WORKS HIGHWAY CONSTRUCTION

This program was financed with $400,000,000 provided by the National Recovery Act and the supplementary $200,000,000 provided by the Hayden-Cartwright Act of June 1934. At the beginning of the year only a small amount of these funds remained available for construction and they did not play an important part in the year's work.

There have been completed since the beginning of the program 35,515 miles of highway, 698 railroad-highway grade separations, 86 separations of grade between highways, and 5,897 bridges, at a cost of $585,368,902 from Public Works funds. Of the roads completed, 18,339 miles, involving $274,337,625 of the Public Works funds, are on the Federal-aid system outside of municipalities; 2,670 miles, built at a cost of $160,656,990 in Public Works funds, are on extensions of the Federal-aid system into and through municipalities; and 14,506 miles, costing $150,374,287 in Public Works funds, are secondary roads. These cost figures include the cost of grade separations and bridges.

Of this mileage, 248 was completed during the year, including 116 miles on the Federal-aid system outside of municipalities, 24 miles on extensions of the system into and through municipalities, and 108 miles of secondary roads. The work completed during the year involved $8,185,691 of Public Works funds. Payments to the States for construction work in progress amounted to $11,701,470.

At the close of the year 119 miles of Public Works highways, to which $6,558,836 had been allotted, were under contract and largely under construction, and 9 miles had been approved for construction at an estimated cost to the Federal Government of $480,403 but were not yet under contract. Details concerning the funds and mileage completed, under contract, and approved for construction, but not under contract, classified according to the four classes of improvement and by States appear in tables 6, 7, 8, 10, 11, and 12.

WORKS PROGRAM HIGHWAY CONSTRUCTION

Active construction of Works Program projects under an authorization of $200,000,000 began in October 1935 and the peak activity with these funds came in 1936 and 1937. The year began with 1,765 miles under contract and largely under construction but with only a small amount available for additional work.

The year's work resulted in the completion of 1,615 miles, bringing the total mileage completed in the program to 12,904 miles. The Works Program funds involved in the completed work amounted to $177,829,247. State and other Federal funds were involved to the extent of $11,519,637.

The classes of roads completed to date and the Works Program funds used to pay the cost were as follows: On the Federal-aid highway system outside of municipalities 2,696 miles costing $44,322,677 in Works Program funds; on extensions of the Federal-aid system within municipalities, 1,033 miles costing $35,738,262 in Works Program funds; on secondary roads within municipalities, 767 miles costing $20,656,120 in Works Program funds; and secondary roads outside of municipalities, 8,408 miles costing $77,112,188 in Works Program funds.

The 372 miles under contract and largely under construction were divided as follows: 32 miles on the Federal-aid system outside of municipalities, 67 miles on extensions of the Federal-aid system through municipalities, 46 miles of secondary road within municipalities, and 227 miles of secondary road outside of municipalities. Works Program funds involved were respectively $4,512,141, $3,697,875, $1,250,709, and $3,875,798.

Similar information for projects approved for construction but not yet under contract appears in tables 8 and 12. Details for work in all stages by States is presented in tables 6 to 12.

Funds available for new work and work approved but not yet under construction totaled $3,834,231. Very little additional highway construction can be begun with Works Program funds as this program is now all but completed.

PROGRESS IN FEDERAL-AID ROAD CONSTRUCTION ON FEDERAL-AID SYSTEM

Improvement of the Federal-aid system was carried on with funds remaining from the previous fiscal year and under an authorization of $125,000,000 for 1938 provided by the act of June 16, 1936. The apportionment of this fund was shown in the last annual report.

During the year 9,101 miles of highway financed with $112,889,045 of Federal-aid funds were brought to completion. These projects involved $106,310,057 of State and emergency funds. Payments to the States for completed work, including work done on projects still under construction, amounted to $119,807,516.

At the close of the year projects under contract and in large part under construction included 9,142 miles of highway at an estimated cost of $252,161,691 to be provided as follows: $125,592,883 Federal aid, and $126,568,808 from State funds. At the same time projects had been approved, but not yet contracted for, covering 1,805 miles, and involving $25,782,883 of Federal-aid funds and $28,150,839 of State funds.

On June 30, 1938, there remained available for new projects $139,986,573 of Federal-aid funds. In greater part they were funds provided for 1939. Tables 6 to 12 show the status of the work by States.

PROGRESS IN CONSTRUCTION OF SECONDARY ROADS WITH FEDERAL AID

Improvement of secondary roads with Federal funds was first undertaken in the emergency program of road construction as a measure to relieve unemployment. Beginning with the fiscal year 1938 such work was made a part of the regular Federal-aid program and $25,000,000 was authorized for each of the fiscal years 1938 and 1939.

In the emergency program Federal funds were available to pay the full cost of construction and, since employment was the primary objective, projects for improvement were selected without delay. The new program differs in that the States are required to match the Federal funds and they must also select a system of secondary roads for improvement, not exceeding 10 percent of the highway mileage, and carefully designed to connect agricultural districts with the main highway system. Pending the selection of such a system only those secondary roads that may reasonably be expected to form part of the system are to be approved for construction. These requirements occasioned some delay in getting the program under way in a number of States.

Where State funds were insufficient to permit expenditures on secondary roads or where authority for such expenditure was lacking, arrangements had to be made with local authorities to raise required amounts and place them under State control. Now that methods of financing the States' share of the cost of secondary roads are being established and highway-planning surveys are supplying information to guide the selection of projects for improvement, it is expected that the program will go forward with a considerable gain in impetus.

In spite of these delays 713 miles were completed, 1,616 miles were under contract at the end of the year, and 905 miles were approved but not under contract, making a total of 3,234 miles. The mileage completed cost $3,581,853, the Federal Government contributing $1,880,320 of this amount. The mileage under contract was to cost $19,076,924 of which $9,616,485 is to be Federal aid. The projects approved but not under contract are estimated to cost $10,288,648 and $4,613,801 has been assigned as Federal aid. Tables 6 to 12 show the status of the work.

The cost of secondary roads in this program has varied greatly, being particularly influenced by local conditions and by availability of suitable materials. The average cost of all projects approved for construction has been $10,000 per mile.

GRADE-CROSSING ELIMINATION AND PROTECTION PROGRAM

Grade-crossing elimination work in 1938 did not equal the all-time peak established in the preceding year when 1,149 crossings were eliminated, but the record of 711 railroad-highway crossings eliminated, 144 separation structures reconstructed, and 744 crossings protected by signals or other safety devices is an important contribution to highway safety and will save much delay and inconvenience to public travel. By far the greater portion of the work done was in the emergency program of grade-crossing elimination financed by $200,000,000 authorized by the Emergency Relief Appropriation Act of 1935. In this program 663 crossings were eliminated, 133 elimination structures were reconstructed, and 603 crossings were protected. Costs were met almost entirely with Federal funds which amounted to $76,575,748. More than half of the expenditure was in municipalities, reflecting the relatively greater dangers and delays at city and suburban crossings.

In the new program of grade-crossing elimination for which $50,000,000 was authorized, 20 crossings were eliminated, 11 existing structures were reconstructed, and 43 crossings were protected. Federal funds involved in this work amounted to $1,495,583.

Since the Public Works program started in 1933, 2,556 crossings have been eliminated and 352 obsolete elimination structures have been reconstructed. The most dangerous and therefore the most important grade crossings are rapidly

being done away with in every State. The substantial program of railroad-highway grade-crossing elimination is considered one of the most advanced and productive undertakings of the present period of highway development.

At the end of the year work under contract consisted of 422 crossing eliminations, 84 elimination structures being reconstructed, and 626 crossings being protected. Table 13 shows details of the above work by States and also the number of projects approved but not under contract at the end of the year.

SUMMARY

The year's work with the funds apportioned to all States resulted in the completion of 12,129 miles of highway and the elimination of 711 railroad-highway grade crossings, the reconstruction of 144 grade separation structures and the protection of 744 crossings at a cost of $239,555,509 in Federal funds and $114,313,028 in State funds. The types of highway completed are shown in table 14.

The completed work was divided as follows: 9,333 miles on the Federal-aid system outside of municipalities, 559 miles of extensions of the system into and through municipalities, 201 miles of secondary roads in municipalities, and 2,036 miles of secondary roads outside of municipalities. Federal funds involved in the respective classes of work were $138,853,674, $40,949,891, $28,262,849, and $31,489,095.

The roads under contract at the end of the year totaled 11,486 miles and involved $203,433,345 of Federal funds, and there were 2,800 miles approved but not yet contracted for, involving $37,571,525 of Federal funds. Unobligated balances available for new work totaled $257,405,917, in large part newly apportioned funds for the fiscal year 1939. Tables 15 and 16, respectively, show the types of road under contract and the types approved but not yet under contract.

TABLE 6.—*Funds allotted to projects completed during the fiscal year 1938*

ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

State	Federal aid, 1917-33	Public Works, 1934-35	Works Program		Federal aid		Total Federal funds	Estimated total cost
			Highways	Grade crossings	Highways, 1936-39	Grade crossings		
Alabama		$27,244	$42,570		$1,646,913		$1,716,727	$3,709,289
Arizona			7,867	$40,226	1,670,771		1,718,864	2,490,537
Arkansas		2,708	32,149	190,367	2,998,127		3,223,351	3,252,570
California			377,011	576,707	3,762,771		4,716,489	7,925,716
Colorado		11,000		259,453	1,967,430		2,237,883	3,912,437
Connecticut		108,613	35,944	384,880	461,219		990,656	1,484,020
Delaware			21,120		255,680		276,800	539,741
Florida		108,370	256,690	181,000	493,993		1,040,053	1,546,093
Georgia		420,369	104,684	533,892	1,402,781		2,461,726	3,954,644
Idaho		10,820	13,500	226,122	1,560,179		1,810,621	2,961,911
Illinois			17,264	1,111,343	4,799,136		5,927,743	10,929,284
Indiana		3,000	153,394	412,564	2,837,986	$48,000	3,454,944	6,432,733
Iowa			43,373	387,234	3,281,580	137,429	3,849,616	7,511,627
Kansas			109,676	625,238	2,253,378	6,290	2,994,582	5,326,301
Kentucky		6,574	127,112	343,520	1,211,252		1,688,458	2,926,257
Louisiana			207,500	1,119,068	286,501		1,613,069	1,948,538
Maine		800	43,249	338,480	1,009,510		1,392,039	2,435,190
Maryland		19,000	131,718	9,673	524,145		684,536	1,208,721
Massachusetts			431,983	428,351	2,206,628		3,066,962	5,274,002
Michigan				462,100	2,844,502		3,306,602	6,536,160
Minnesota		81,163	6,909	132,637	2,942,308	18,111	3,181,128	6,200,301
Mississippi		210,286	225,702	926,037	1,498,758		2,860,783	4,391,468
Missouri				1,386,671	4,205,783		5,592,454	10,107,276
Montana			13,720	72,191	2,426,674		2,512,585	4,426,814
Nebraska			74,081	103,005	1,624,560		1,801,646	3,489,386
Nevada					1,927,619		1,927,619	2,310,398
New Hampshire			28,110	86,283	209,326		323,719	540,355
New Jersey		132,557		46,192	942,731		1,121,480	2,340,533
New Mexico		56,663		56,505	3,284,997		3,398,165	5,473,761
New York		97,315	55,155	2,700,669	6,695,271		9,548,410	17,853,474
North Carolina		371,841	498,445	533,643	2,697,218	43,180	4,144,327	6,844,929
North Dakota		233,667	159,107	710,379	999,312		2,102,465	2,191,489
Ohio		90,500	790,342	924,037	2,625,613		4,430,492	7,243,866
Oklahoma	$215,209	4,709	44,873	535,228	2,159,803		2,959,822	5,373,454
Oregon			380,303	250,692	2,429,590	83,178	3,143,763	4,869,519
Pennsylvania		262,779	941,662	2,689,699	6,887,610		10,781,750	18,234,628
Rhode Island		2,478	3,837	8,074	539,214		553,603	1,137,685
South Carolina		86,493		652,696	1,617,096		2,356,285	4,660,905

TABLE 6.—*Funds allotted to projects completed during the fiscal year 1938*—Contd.

ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES—Continued

State	Federal aid, 1917-33	Public Works, 1934-35	Works Program		Federal aid		Total Federal funds	Estimated total cost
			Highways	Grade crossings	Highways, 1936-39	Grade crossings		
South Dakota			$242,282	$886,911	$1,412,569	$17,500	$2,559,262	$3,651,781
Tennessee			420,381	360,553	1,063,749		1,844,683	2,941,809
Texas	$52,968		167,558	277,614	7,775,423	19,700	8,293,263	16,643,120
Utah			42,927	212,531	987,457		1,242,915	1,686,658
Vermont			7,770	135,094	673,752	7,933	824,549	1,562,647
Virginia		$184,866		400,894	2,235,148		2,820,908	5,175,906
Washington				2,214	1,353,633	68,181	1,424,028	2,675,213
West Virginia		188,854	297,370	740,868	744,270		1,971,362	2,750,688
Wisconsin			186,988	467,845	3,669,315		4,324,148	8,217,489
Wyoming			57,294	183,613	1,804,304		2,045,211	3,133,420
Hawaii		169,565	8,907		412,656		591,128	1,026,795
Total	268,177	2,892,234	6,810,527	23,112,993	105,320,241	449,502	138,853,674	239,461,538

ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

Alabama		$54,028		$567,449	$53,225		$674,702	$768,325
Arizona				7,768	59,752		67,520	94,287
Arkansas		25,977	$269,125	529,907	99,910		924,919	928,338
California			216,200	256,175	148,621		620,996	792,495
Colorado					36,043		36,043	67,524
Connecticut		34,360	197,790		36,100		268,250	328,460
Delaware		3,069	195,870		7,895		206,834	215,817
Florida		134,300	69,309	258,279	246,771		708,659	963,883
Georgia		208,831	70,221	308,451	66,914		654,417	731,729
Idaho		42,124	6,218	229,642	45,491		323,475	369,347
Illinois		322,649	170	1,493,565	853,758	$17,000	2,687,142	3,746,238
Indiana			347,406	1,376,248	273,658		1,997,312	2,297,949
Iowa			375,188	796,275	301,140	19,500	1,492,103	1,922,710
Kansas			7,556	673,654	60,278		741,488	1,226,946
Kentucky			53,617	401,737	296,013		751,367	1,115,512
Louisiana			203,270	168,364			371,634	371,654
Maine			9,000	2,210	111,440		122,650	234,273
Maryland		216,800					216,800	220,454
Massachusetts		514,240	914,575	440,820	5,040		1,874,675	1,879,756
Michigan				764,500	533,781		1,298,281	1,898,906
Minnesota		160,120	64,987	154,988	382,487	191,194	953,776	1,481,860
Mississippi		9,533	326,960	362,000	177,455		875,948	1,056,051
Missouri		700,723	312,205	1,285,061	308,428		2,606,417	2,987,955
Montana					39,494		39,494	70,430
Nebraska		39,755	71,392	886,446	32,478		1,030,071	1,062,931
Nevada					124,003	35,109	159,112	180,361
New Hampshire				103,581	12,161		115,742	129,133
New Jersey			1,595,224	272,256	10,440		1,877,920	1,894,270
New Mexico			10,685	530,119	1,154		541,958	547,671
New York		491,136	675,846	1,945,246	441,068		3,553,296	4,398,912
North Carolina			291,631	306,592	126,769		724,992	865,170
North Dakota		1,490	128,789	259,357	13,413		403,049	409,722
Ohio		12,118	147,263	184,009	155,852		499,242	671,571
Oklahoma			153,046	747,872	40,783		941,701	1,004,809
Oregon		65,000	522,122	739,834	97,459	33,719	1,458,134	1,733,583
Pennsylvania		305,891	248,508	1,746,072	431,612		2,732,083	3,386,600
Rhode Island					31,260		31,260	77,528
South Carolina		167,812	242,874	289,670	133,257		833,613	1,041,885
South Dakota		6,280	76,883	322,453	21,264	19,770	446,650	464,572
Tennessee			223,723	307,640	107,954		639,317	752,150
Texas		49,645	8,041	794,510	207,665		1,059,861	1,375,829
Utah			56,518	128,441	223,049		408,008	501,053
Vermont			15,110	39,150	119,098	2,820	176,178	326,757
Virginia		30,814	150,311	381,678	107,751	50,600	721,154	838,456
Washington				273,682	85,972		359,654	441,997
West Virginia		17,240	151,868	481,546	93,539		744,193	837,851
Wisconsin			13,300		475,104		488,404	994,115
Wyoming		2,784	18,609	235,856	63,828		321,077	361,770
District of Columbia						168,320	168,320	168,320
Total		3,616,719	8,441,410	21,053,103	7,300,627	538,032	40,949,891	50,237,915

TABLE 6.—*Funds allotted to projects completed during the fiscal year 1938*—Contd.

ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

State	Public Works, 1934–35	Works Program		Federal aid		Total Federal funds	Estimated total cost
		Highways	Grade crossings	Secondary or feeder	Grade crossings		
Alabama		$37,300	$282,564			$319,864	$319,864
Arizona			6,095			6,095	6,095
Arkansas		24,781	664,085			688,866	694,880
California		316,000	1,063,353	$680		1,380,033	1,615,820
Colorado			665,124			665,124	665,124
Connecticut		44,550	350,000			394,550	415,911
Florida		28,890	110,300			139,190	139,837
Georgia		321,354	278,608			599,962	616,026
Idaho			204,352	22,010		226,362	248,819
Illinois		407,954	300,830		$2,500	711,284	713,031
Indiana		242,214	972,814		117,790	1,332,818	1,341,998
Iowa		1,981	69,861			71,842	74,377
Kansas		21,151				21,151	21,318
Kentucky		152,203	947,119	1,047		1,100,369	1,343,671
Louisiana		323,483	141,537			465,020	499,971
Maine		55,000		46,900		101,900	150,716
Maryland		85,000	10,360			95,360	95,415
Michigan			586,600			586,600	686,600
Minnesota		251,020	640,304		25,913	917,237	1,094,344
Mississippi			35,400			35,400	35,400
Missouri		165,624	1,771,128	10,212		1,946,964	1,967,586
Montana		185,240				185,240	185,267
Nebraska		244,873	131,822	4,987		381,682	386,700
Nevada		41,350	198,694			240,044	260,450
New Hampshire		65,870	168,326			234,196	234,876
New Jersey		303,530	1,562,329			1,865,859	1,865,859
New Mexico			108,236			108,236	109,216
New York		160,400	1,505,730	34,220		1,700,350	1,734,570
North Carolina		190,597	601,741	10,394		802,732	828,656
North Dakota			471,271			471,271	471,383
Ohio		826,758	305,001			1,131,759	1,182,055
Oklahoma		235,534	235,376			470,910	472,972
Oregon				552		552	904
Pennsylvania		2,220,419	770,572			2,990,991	3,435,285
Rhode Island			36,240			36,240	36,240
South Carolina			114,599			114,599	114,599
South Dakota		14,977	263,009		7,520	285,506	285,552
Tennessee		15,765	1,185,142			1,200,907	1,211,804
Texas			1,520,269			1,520,269	1,520,272
Utah		32,745	383,451		14,000	430,196	471,187
Virginia		26,909	74,544			101,453	102,444
Washington		146,371	397,851		66,593	610,815	673,016
West Virginia			298,065			298,065	298,565
Wisconsin		7,234	1,002,352			1,009,586	1,014,226
Wyoming			265,400			265,400	265,400
Total		7,197,077	20,700,454	131,002	234,316	28,262,849	29,808,301

ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

Alabama		$512,367	$233,498		$16,100	$761,965	$791,218
Arizona		80,743	96,532	$66,705		243,980	286,196
Arkansas	$32,129	100,804	140,694			273,627	276,459
California		405,197	179,396	73,086		657,679	768,338
Colorado			71,670		1,880	73,550	73,550
Connecticut		504,749	156,370			661,119	734,431
Delaware		44,195				44,195	46,948
Florida		61,200	223,125			284,325	284,675
Georgia	63,421	794,471	214,442	19,060		1,091,394	1,123,447
Idaho	1,886		59,395	128,264		189,545	321,838
Illinois	32,800	391,349	187,861	39,900		651,910	698,246
Indiana		719,431	371,041			1,090,472	1,210,804
Iowa		668,940	338,937		58,900	1,066,777	1,145,022
Kansas		359,447		12,458		371,905	384,396
Kentucky	14,079	160,050	103,796	121,526		399,451	535,286
Louisiana	319,506	176,836	195,683			692,025	714,478
Maine	12,062	241,850	172,332	66,933		493,177	578,757
Maryland		85,317	549,559			634,876	636,969
Massachusetts		666,750	1,160,788			1,827,538	1,827,546
Michigan		17,000	171,150			188,150	220,573
Minnesota	136,419	150,841	208,592			495,852	533,020
Mississippi	26,380	304,052	179,279			509,711	521,531
Missouri	229,564	244,248	162,932	457,834		1,094,578	1,608,407

TABLE 6.—*Funds allotted to projects completed during the fiscal year 1938*—Contd.

ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES—Continued

State	Public Works, 1934–35	Works Program		Federal aid		Total Federal funds	Estimated total cost
		Highways	Grade crossings	Secondary or feeder	Grade crossings		
Montana	$34,791	$141,198				$175,989	$176,578
Nebraska	31,054	157,596	$99,291	$41,669		329,610	388,615
Nevada		3,561		153,067		156,628	217,563
New Hampshire		162,290	108,103			270,393	300,464
New Jersey	303,483	272,496	592,496			1,168,475	1,191,390
New Mexico	1,770	493,344				495,114	495,704
New York		587,275	576,670	80,092		1,244,037	1,327,587
North Carolina		534,202	219,384	91,078		844,664	973,767
North Dakota		75,939	77,821			153,760	154,274
Ohio		1,423,036	609,446			2,032,482	2,068,885
Oklahoma		113,513	423,907			537,420	655,789
Oregon	17,100	89,274	126,924	74,483	$61,993	369,774	430,622
Pennsylvania	129,261	2,508,980	1,358,675	29,330		4,026,246	4,112,893
Rhode Island		2,312		58,984		61,296	125,118
South Carolina	87,800	242,667	139,716			470,183	490,573
South Dakota	9,600	209,709	174,030		6,170	399,509	399,509
Tennessee		632,904	392,419			1,025,323	1,053,526
Texas		243,161	498,703	24,545	38,100	804,509	829,604
Utah		317,452	87,220	21,346	57,000	483,018	525,642
Vermont		24,858	56,375	37,335	3,480	122,048	191,014
Virginia	106,258	120,812	341,496	27,650	30,110	626,326	673,430
Washington	5,844	34,959	99,845	61,874		202,522	298,434
West Virginia	81,531	719,230	98,320			899,081	1,018,106
Wisconsin		35,000	451,285	15,250		501,535	558,271
Wyoming		37,721		46,849		84,570	113,530
Hawaii		206,782				206,782	267,760
Total	1,676,738	16,080,108	11,709,198	1,749,318	273,733	31,489,095	34,360,783

TOTAL

State	Federal aid, 1917–33	Public Works, 1934–35	Works Program		Federal aid			Total Federal funds	Estimated total cost
			Highways	Grade crossings	Highways, 1936–39	Secondary or feeder	Grade crossings		
Alabama		$81,272	$592,237	$1,083,511	$1,700,138		$16,100	$3,473,258	$5,588,696
Arizona			88,610	150,621	1,730,523	$66,705		2,036,459	2,877,115
Arkansas		60,814	426,858	1,525,054	3,098,036			5,110,762	5,152,247
California			1,314,408	2,075,631	3,911,392	73,766		7,375,197	11,102,370
Colorado		11,000		996,247	2,003,473		1,880	3,012,600	4,718,635
Connecticut		142,973	783,033	891,250	497,319			2,314,575	2,962,822
Delaware		3,069	261,185		263,575			527,829	802,505
Florida		242,670	416,089	772,704	740,764			2,172,227	2,934,488
Georgia		692,621	1,290,730	1,335,393	1,469,695	19,060		4,807,499	6,425,846
Idaho		54,831	19,718	719,511	1,605,670	150,274		2,550,004	3,901,915
Illinois		355,449	816,737	3,093,599	5,652,894	39,900	19,500	9,978,079	16,086,800
Indiana		3,000	1,462,445	3,132,666	3,111,645		165,790	7,875,546	11,283,484
Iowa			1,089,482	1,592,307	3,582,720		215,829	6,480,338	10,653,735
Kansas			497,830	1,298,892	2,313,656	12,458	6,290	4,129,126	6,958,961
Kentucky		20,653	492,982	1,796,172	1,507,265	122,573		3,939,645	5,920,726
Louisiana		319,506	911,089	1,624,652	286,501			3,141,748	3,531,640
Maine		12,862	349,099	513,022	1,120,950	113,833		2,109,766	3,398,937
Maryland		235,800	302,035	569,592	524,145			1,631,572	2,161,559
Massachusetts		514,240	2,013,308	2,029,959	2,211,667			6,769,174	8,981,304
Michigan			17,000	1,984,350	3,378,283			5,379,633	9,242,239
Minnesota		377,702	473,757	1,136,521	3,324,796		235,218	5,547,994	9,309,524
Mississippi		246,198	856,714	1,502,717	1,676,213			4,281,842	6,004,450
Missouri		930,287	722,077	4,605,792	4,514,211	468,046		11,240,413	16,671,224
Montana		34,791	340,158	72,191	2,466,168			2,913,308	4,859,090
Nebraska		70,809	547,942	1,220,563	1,657,038	46,656		3,543,008	5,327,632
Nevada			44,911	198,694	2,051,622	153,067	35,109	2,483,403	2,968,772
New Hampshire			256,271	466,292	221,487			944,050	1,204,828
New Jersey		436,039	2,171,251	2,473,273	953,171			6,033,734	7,292,051
New Mexico		58,433	504,029	694,860	3,286,151			4,543,473	6,626,352
New York		588,451	1,478,676	6,728,311	7,136,340	114,312		16,046,093	25,314,543
North Carolina		371,841	1,514,876	1,661,360	2,823,987	101,472	43,180	6,516,716	9,512,523
North Dakota		235,157	363,835	1,518,828	1,012,725			3,130,545	3,226,868

TABLE 6.—*Funds allotted to projects completed during the fiscal year 1938*—Contd.

TOTAL—Continued

State	Federal aid, 1917–33	Public Works, 1934–35	Works Program		Federal aid			Total Federal funds	Estimated total cost
			Highways	Grade crossings	Highways, 1936–39	Secondary or feeder	Grade crossings		
Ohio		$102,618	$3,187,398	$2,022,494	$2,781,461			$8,093,974	$11,166,378
Oklahoma	$215,209	4,709	546,966	1,942,383	2,200,586			4,909,853	7,507,024
Oregon		82,100	991,699	1,117,450	2,527,049	$75,035	$178,890	4,972,223	7,034,627
Pennsylvania		697,931	5,919,569	6,565,018	7,319,221	29,330		20,531,069	29,169,404
Rhode Island		2,478	6,150	44,324	570,474	58,984		682,400	1,376,571
South Carolina		342,106	485,540	1,196,681	1,750,353			3,774,680	6,307,963
South Dakota		15,880	543,851	1,646,403	1,433,833		50,960	3,690,927	4,801,415
Tennessee			1,292,773	2,245,751	1,171,703			4,710,230	5,959,289
Texas	52,968	49,645	418,759	3,091,095	7,983,089	24,545	57,800	11,677,901	20,368,824
Utah			449,641	811,644	1,210,506	21,346	71,000	2,564,137	3,184,541
Vermont			47,738	230,619	792,849	37,335	14,233	1,122,774	2,080,417
Virginia		321,938	298,032	1,198,612	2,312,899	27,650	80,710	4,269,841	6,790,237
Washington		5,844	181,330	773,593	1,439,605	61,874	134,774	2,597,020	4,088,660
West Virginia		287,625	1,168,468	1,618,799	837,810			3,912,702	4,905,210
Wisconsin			242,522	1,921,482	4,144,419	15,250		6,323,673	10,784,101
Wyoming		2,784	113,624	684,869	1,868,132	46,849		2,716,258	3,874,120
Hawaii		169,565	215,690		412,656			797,911	1,294,555
District of Columbia							168,320	168,320	168,320
Total	268,177	8,185,691	38,529,122	76,575,748	112,620,868	1,880,320	1,495,583	239,555,509	353,868,237

TABLE 7.—*Funds allotted to projects under contract on June 30, 1938*

ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

State	Public Works, 1934–35	Works Program		Federal aid		Total Federal funds	Estimated total cost
		Highways	Grade crossings	Highways, 1936–39	Grade crossings		
Alabama	$17,000	$104,100	$60,519	$3,302,346	$32,024	$3,515,989	$6,820,773
Arizona		38,548	18,841	1,363,703	4,718	1,425,810	1,883,750
Arkansas	14,764	100,026	172,109	1,083,304	265,112	1,635,315	1,647,228
California		116,218	112,295	6,330,549	783,652	7,342,714	13,028,538
Colorado		554,697	39,474	1,383,120	37,744	2,015,035	3,159,079
Connecticut	1,970		127,600	478,086		607,656	1,101,349
Delaware		10,234	279,052	336,176	5,000	630,462	967,757
Florida	39,920	38,957	49,918	1,442,681	10,616	1,582,092	3,024,773
Georgia	259,564	319,104	872,919	3,542,571	18,346	5,012,504	8,555,076
Idaho	34,162	52,439	25,117	1,204,630	99,994	1,416,342	2,245,896
Illinois		140,310	414,858	4,751,691	478,675	5,785,534	10,499,486
Indiana	31,500	49,000	122,950	3,216,617	947,600	4,367,667	7,600,236
Iowa		74,865	84,060	3,030,138	364,000	3,553,003	7,302,122
Kansas		74,925	78,694	2,371,844	491,604	3,017,067	5,476,434
Kentucky	13,376	55,894	159,026	2,992,278	13,609	3,231,183	6,251,945
Louisiana	44,459	121,573	220,222	2,709,725	146,478	3,245,457	13,334,704
Maine		25,152	69,281	1,158,655	49,687	1,302,775	2,485,549
Maryland	131,500	291,343	343,899	1,096,021	64,586	1,927,349	3,027,509
Massachusetts		436,840	70,410	857,864	15,710	1,380,824	2,676,535
Michigan	96,788	94,521	169,432	2,474,244	479,602	3,314,587	5,807,126
Minnesota	13,041	79,000	176,500	2,327,036	73,868	2,669,445	5,029,615
Mississippi	80,143	24,239	345,433	2,926,521	107,400	3,483,836	7,591,455
Missouri	30,000	122,484	92,132	2,686,299	229,970	3,160,885	5,945,524
Montana	7,599	34,485	105,187	974,303	253,298	1,374,872	2,138,205
Nebraska		58,061	86,603	3,655,931	188,967	3,989,562	7,669,540
Nevada	6,682	53,646	13,308	1,222,535	146,452	1,422,623	1,611,210
New Hampshire		14,178	14,443	580,440	65,175	674,236	1,261,376
New Jersey	30,305	46,947	188,700	1,003,533	104,554	1,374,039	2,415,065
New Mexico		43,071	25,879	1,505,836	122,441	1,697,227	2,496,191
New York	222,900	144,795	22,000	7,625,282	1,012,700	9,027,677	16,895,064
North Carolina	8,895	50,733	192,799	3,232,277	272,900	3,757,604	7,224,521
North Dakota	216,988	43,009	48,112	2,828,614	12,046	3,148,769	3,273,874
Ohio	117,975	115,062	1,722,688	3,911,813	32,120	5,899,658	9,877,362
Oklahoma	11,446	87,560	172,271	2,741,767	17,343	3,030,387	5,563,700
Oregon	15,000	45,580	35,013	1,480,590	48,685	1,624,868	2,652,409
Pennsylvania	44,426	203,842	1,103,947	3,584,384	208,824	5,145,423	8,800,283
Rhode Island				382,966	223,897	606,863	989,829

TABLE 7.—*Funds allotted to projects under contract on June 30, 1938*—Continued

ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES—Con.

State	Public Works, 1934-35	Works Program		Federal aid		Total Federal funds	Estimated total cost
		Highways	Grade crossings	Highways, 1936-39	Grade crossings		
South Carolina	$99,580	$40,530	$214,539	$2,378,282	$22,137	$2,755,068	$5,745,158
South Dakota	90,681	50,997	106,996	2,293,020	96,548	2,638,242	4,475,720
Tennessee		41,923	58,560	2,497,746	14,381	2,612,610	5,110,356
Texas	174,061	179,840	162,840	6,398,356		6,915,097	13,521,758
Utah		31,007	18,461	725,104	108,143	883,015	1,171,326
Vermont		13,865	10,900	692,676	158,996	876,437	1,809,732
Virginia	2,150	90,859	55,358	2,679,032	132,725	2,960,124	5,641,708
Washington	25,090	65,824	46,426	2,471,774	124,799	2,733,823	5,001,177
West Virginia	23,168	33,471	277,876	1,085,323	214,004	1,633,842	2,205,637
Wisconsin	56,700	72,000	89,783	2,329,267	572,947	3,120,697	5,753,907
Wyoming		33,287	20,412	1,399,651	144,884	1,598,234	2,477,665
Hawaii		10,000	169,698	475,695		655,393	1,146,760
Puerto Rico				562,390	61,550	623,940	1,190,759
Total	1,961,743	4,512,141	9,067,480	113,784,986	9,080,511	138,406,861	253,582,751

ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

Alabama	$273,322		$131,700	$287,265	$81,800	$774,087	$1,069,243
Arizona				6,108		6,108	8,483
Arkansas	800		14,460	16,865	13,370	45,495	46,520
California	20,460			572,275	203,970	796,705	1,298,605
Colorado		$8,200		18,260	2,450	28,910	47,278
Connecticut			295,180	101,905		397,085	512,440
Delaware				12,109		12,109	24,834
Florida			19,820	91,850		111,670	203,520
Georgia	344,120	506,240	93,090	420,100		1,363,550	2,001,350
Idaho			1,344	18,032		19,376	31,515
Illinois	423,083		1,045,550	1,149,160	530,000	3,147,793	4,354,732
Indiana	16,400			344,013	10,400	370,813	728,306
Iowa		30,000	1,005,000	211,435	619,800	1,866,235	2,179,962
Kansas	20,885	143,071	1,110,603	576,783	203,862	2,055,204	2,746,553
Kentucky	35,261	174,680	417,814	118,950	154,478	901,183	1,020,133
Louisiana		76,360	345,820	14,460		436,640	504,639
Maine	8,645			243,889	134,770	387,304	630,183
Maryland	115,570	154,193	10,000			279,763	279,763
Massachusetts				521,581		521,581	1,043,165
Michigan		43,400	35,000	798,350	192,150	1,068,900	2,022,500
Minnesota	178,568		407,520	543,681	80,155	1,209,924	1,783,537
Mississippi	5,300	62,100	105,100	387,960	75,300	635,760	1,087,880
Missouri		640,518	12,675	208,462	155,240	1,016,895	1,281,679
Montana	40,949	60,900		8,303	107,474	217,626	224,088
Nebraska		146,793	80,551	88,181	12,108	327,633	416,441
Nevada			4,257	16,363		20,620	23,128
New Hampshire				24,960		24,960	50,011
New Jersey	76,178			421,385		497,563	938,640
New Mexico			3,129			3,129	3,129
New York	90,000	23,700	263,750	758,345		1,135,795	1,985,186
North Carolina	40,085	16,641	77,330	220,865		354,921	593,906
North Dakota	237,831	269,211		67,075	337,300	911,417	912,734
Ohio		395,780	1,609,452	509,647		2,514,879	3,069,394
Oklahoma	22,482		7,800	125,330		155,612	263,897
Oregon				160,741	276,370	437,111	540,862
Pennsylvania	102,707	586,310	1,076,115	334,043		2,099,175	2,540,093
Rhode Island				101,400		101,400	202,800
South Carolina	24,471	141,878	74,092	217,343	9,000	466,784	783,219
South Dakota	8,723	167,900	56,370	32,010	18,835	283,838	319,285
Tennessee				221,611		221,611	443,222
Texas		46,000	283,130	200,132		529,262	1,074,817
Utah				161,930	2,030	163,960	227,745
Vermont				30,925	2,400	33,325	64,250
Virginia			568,954	66,860	147,790	783,604	850,464
Washington	11,596			156,350		167,946	309,586
West Virginia	160,821		212,500	191,550	62,000	626,871	670,063
Wisconsin		4,000	42,419	1,026,190	463,840	1,536,449	2,914,009
Wyoming	17,900		90,800	2,865		111,565	113,350
Total	2,276,157	3,697,875	9,501,325	11,807,897	3,896,892	31,180,146	44,441,139

TABLE 7.—*Funds allotted to projects under contract on June 30, 1938*—Continued

ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

State	Public Works, 1934–35	Works Program		Federal aid		Total Federal funds	Estimated total cost
		Highways	Grade crossings	Secondary or feeder	Grade crossings		
Alabama				$3,550	$315,850	$319,400	$322,950
Arkansas			$6,475			6,475	6,475
California		$21,938			212,760	234,698	234,698
Colorado			316,470	5,630	3,550	325,650	330,150
Delaware					2,000	2,000	2,000
Florida			43,290			43,290	43,290
Georgia		363,810	517,950	12,350		894,110	906,460
Idaho				2,901		2,901	7,570
Illinois		5,600	48,922	45,100	4,500	104,122	155,626
Indiana				2,492	95,000	97,492	100,500
Iowa					3,000	3,000	3,252
Kansas				21,835	3,950	25,785	47,620
Kentucky			157,000	413	62,380	219,793	220,456
Louisiana			367,720			367,720	367,736
Maine				22,200		22,200	44,400
Maryland			72,500			72,500	72,500
Massachusetts					54,710	54,710	54,710
Michigan					247,775	247,775	247,775
Minnesota				24,898	425,833	450,731	479,443
Mississippi		34,100	21,600		70,000	125,700	125,700
Missouri			590,923	1,070		591,993	593,063
Montana			80,744		276,614	357,358	417,003
Nebraska		7,378	94,818	20,733	110,708	233,637	254,370
Nevada				166	3,309	3,475	3,501
New Jersey			161,724		100,225	261,949	261,949
New York		40,070	1,095,900	8,980		1,144,950	1,153,930
North Carolina		37,900	634,730	20,520		693,150	713,670
North Dakota		13,500	364,000		184,700	562,200	562,200
Ohio		136,809	2,038,739			2,175,548	2,578,890
Oklahoma		56,010	144,700	6,725		207,433	213,350
Oregon				678		678	1,216
Pennsylvania		208,174	285,377	8,271		501,822	557,232
South Carolina		89,055	145,857	3,100	38,500	276,512	286,209
South Dakota			9,260		45,370	54,630	54,630
Tennessee		175,890	519,850			695,740	695,740
Texas		60,475	2,920	19,255	9,250	91,900	130,543
Utah				16,580		16,580	30,520
Vermont				14,650		14,650	33,180
Virginia			3,892	1,050		4,942	5,992
Washington				40,300	250,690	290,990	327,326
West Virginia			406,400		58,900	465,300	465,300
Wisconsin			347,148	55,640		402,788	473,493
Wyoming				58,010	5,030	63,040	98,910
Total		1,250,709	8,478,909	417,095	2,584,604	12,731,317	13,685,528

ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

Alabama		$156,200	$106,600	$204,250	$154,460	$621,510	$826,034
Arizona	$19,573			192,948		212,521	308,558
Arkansas				6,563		6,563	13,126
California	71,027			474,070		545,097	901,681
Colorado		36,285		329,293	2,475	368,053	636,179
Connecticut			254,140			254,140	254,140
Delaware					70,270	70,270	70,270
Florida			59,610	10,061		69,671	79,732
Georgia	628,230	983,740	246,490	159,649		2,018,109	2,325,499
Idaho			52,614	128,808		181,422	342,741
Illinois	16,098	117,331	135,900	710,666		979,995	1,763,632
Indiana			28,293	210,308	317,913	556,514	1,000,640
Kansas		16,102		23,650		39,752	63,402
Kentucky		44,323	17,858	211,697	28,855	302,733	764,604
Louisiana	7,420	97,070		35,961		140,451	176,621
Maine		13,000		122,518	51,200	186,718	309,236
Maryland	295,516	223,048	432,075	3,132		953,771	1,047,990
Massachusetts		521,293	521,380	2,650		1,045,323	1,569,267
Michigan		185,000		11,681	25,625	222,306	233,987
Minnesota	206,861			156,529	27,020	390,410	587,149
Mississippi	120,000					120,000	120,000
Missouri				192,625		192,625	388,410
Montana	66,036	23,054		7,865		96,955	135,377
Nebraska		40,869		223,699		264,568	488,267
Nevada	15,297			303,739		319,036	365,877

TABLE 7.—*Funds allotted to projects under contract on June 30, 1938*—Continued

ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES—Continued

State	Public Works, 1934–35	Works Program		Federal aid		Total Federal funds	Estimated total cost
		Highways	Grade crossings	Secondary or feeder	Grade crossings		
New Hampshire		$87,794		$50,152		$137,946	$202,427
New Jersey			$246,680			246,680	246,680
New Mexico				330,193		330,193	541,394
New York	$16,000	79,630	52,700	1,172,150	$832,400	2,152,880	3,329,580
North Carolina	30,383	75,600	241,230	333,550	235,600	916,363	1,249,913
North Dakota	24,610	72,680			16,490	113,780	113,780
Ohio		49,680	383,812	92,200		525,692	648,830
Oklahoma	195,373	16,500		55,764		267,637	345,334
Oregon	66,468		10,000	282,524		358,992	609,566
Pennsylvania	32,701	292,870	218,128	665,390	75,086	1,284,175	2,129,081
Rhode Island				42,535		42,535	85,070
South Carolina	44,000	281,959		240,362	15,000	581,321	921,879
South Dakota	5,130	11,370	201,132	6,250	53,990	277,872	341,880
Tennessee		165,205	93,710	123,803		382,718	506,521
Texas	184,531	39,116	7,790	739,901	28,850	1,000,188	1,926,920
Utah				199,660	1,760	201,420	363,035
Vermont				73,203	46,292	119,495	218,168
Virginia	43,900	180,679		225,993	56,600	507,172	763,093
Washington	10,000		43,356	186,678	83,036	323,070	493,020
West Virginia	193,582	65,400	76,490	104,000	61,950	501,422	607,360
Wisconsin	14,200		19,537	226,835	75,000	335,572	605,325
Wyoming				175,810	9,500	185,310	294,040
Hawaii	14,000			28,125		42,125	70,250
Puerto Rico				121,950		121,950	244,000
Total	2,320,936	3,875,798	3,449,525	9,199,390	2,269,372	21,115,021	31,629,565

TOTAL

State	Public Works, 1934–35	Works Program		Federal aid			Total Federal funds	Estimated total cost
		Highways	Grade crossings	Highways, 1936–39	Secondary or feeder	Grade crossings		
Alabama	$290,323	$260,300	$298,819	$3,589,610	$207,800	$584,134	$5,230,986	$9,039,001
Arizona	19,573	38,548	18,841	1,369,811	192,948	4,718	1,644,439	2,200,791
Arkansas	15,564	100,026	193,044	1,100,169	6,563	278,482	1,693,848	1,713,349
California	91,487	138,156	112,295	6,902,824	474,070	1,200,383	8,919,215	15,463,522
Colorado		599,182	355,944	1,401,380	334,923	46,219	2,737,648	4,172,687
Connecticut	1,970		676,920	579,991			1,258,881	1,867,929
Delaware		10,234	279,052	348,285		77,270	714,841	1,064,860
Florida	39,920	38,957	172,638	1,534,531	10,061	10,616	1,806,723	3,351,315
Georgia	1,231,914	2,172,894	1,730,449	3,962,671	171,999	18,346	9,288,273	13,788,384
Idaho	34,162	52,439	79,075	1,222,662	131,709	99,994	1,620,041	2,627,722
Illinois	439,181	263,241	1,645,230	5,900,852	755,766	1,013,174	10,017,444	16,773,475
Indiana	47,900	49,000	151,243	3,560,630	212,800	1,370,913	5,392,456	9,429,682
Iowa		104,865	1,089,000	3,241,573		986,800	5,422,238	9,485,336
Kansas	20,885	234,098	1,189,297	2,948,628	45,485	699,416	5,137,809	8,334,010
Kentucky	48,637	274,897	751,698	3,111,228	212,110	259,322	4,657,892	8,257,138
Louisiana	51,879	298,003	933,762	2,724,185	35,961	146,478	4,190,268	14,383,700
Maine	8,645	38,152	69,281	1,402,543	144,718	235,657	1,898,996	3,469,368
Maryland	542,585	668,584	858,474	1,096,021	3,132	64,586	3,233,382	4,427,761
Massachusetts		958,133	591,790	1,379,445	2,650	70,420	3,002,438	5,343,676
Michigan	96,788	322,921	204,432	3,272,594	11,681	945,152	4,853,568	8,311,388
Minnesota	398,470	79,000	584,020	2,870,717	181,427	606,876	4,720,510	7,879,745
Mississippi	205,413	120,539	472,133	3,314,481		252,700	4,365,296	8,925,035
Missouri	30,000	763,002	695,730	2,894,762	193,695	385,210	4,962,399	8,208,677
Montana	114,585	118,438	185,931	982,606	7,865	637,386	2,046,811	2,914,673
Nebraska		253,101	261,972	3,744,112	244,431	311,783	4,815,399	8,828,618
Nevada	21,979	33,646	17,565	1,238,898	303,905	149,761	1,765,754	2,003,716
New Hampshire		101,972	14,443	605,400	50,152	65,175	837,142	1,513,814
New Jersey	106,483	46,947	597,104	1,424,918		204,779	2,380,231	3,862,334
New Mexico		43,071	29,008	1,505,836	330,193	122,441	2,030,549	3,040,714
New York	328,900	288,195	1,434,350	8,383,628	1,181,130	1,845,100	13,461,303	23,363,760
North Carolina	79,364	180,874	1,146,089	3,453,142	354,070	508,500	5,722,039	9,782,010
North Dakota	479,429	398,400	412,112	2,895,689		550,536	4,736,166	4,862,588
Ohio	117,975	697,332	5,754,691	4,421,461	92,200	32,120	11,115,779	16,174,476
Oklahoma	229,300	160,070	324,771	2,867,098	62,487	17,343	3,661,069	6,386,281
Oregon	81,467	45,580	45,013	1,641,331	283,202	325,055	2,421,648	3,804,053
Pennsylvania	179,834	1,291,196	2,683,567	3,918,426	673,661	283,910	9,030,594	14,026,689
Rhode Island				484,366	42,535	223,897	750,798	1,277,699
South Carolina	168,051	553,422	434,488	2,595,624	243,462	84,637	4,079,684	7,736,466

TABLE 7.—*Funds allotted to projects under contract on June 30, 1938*—Continued

TOTAL—Continued

State	Public Works, 1934–35	Works Program		Federal aid			Total Federal funds	Estimated total cost
		Highways	Grade crossings	Highways, 1936–39	Secondary or feeder	Grade crossings		
South Dakota	$104,534	$230,267	$373,758	$2,325,030	$6,250	$214,743	$3,254,582	$5,191,515
Tennessee		383,018	672,129	2,719,357	125,803	14,381	3,912,679	6,755,839
Texas	358,592	325,431	456,680	6,598,486	759,157	38,100	8,536,446	16,654,038
Utah		31,007	18,461	887,334	216,240	111,933	1,264,975	1,792,626
Vermont		13,865	10,900	723,601	87,853	207,688	1,043,907	2,125,330
Virginia	46,050	271,538	628,204	2,745,892	227,043	337,115	4,255,842	7,261,257
Washington	46,596	65,824	89,782	2,628,124	226,978	458,525	3,515,829	6,131,109
West Virginia	377,571	98,871	973,266	1,276,873	101,000	396,854	3,227,435	3,948,359
Wisconsin	70,900	76,000	498,857	3,355,457	282,475	1,111,787	5,395,506	9,746,734
Wyoming	17,900	33,287	111,212	1,402,516	233,820	159,414	1,958,149	2,983,965
Hawaii	14,000	10,000	169,698	475,695	28,125		697,518	1,217,010
Puerto Rico				562,390	121,950	61,550	745,890	1,434,759
Total	6,558,836	13,336,523	30,497,239	125,592,883	9,616,485	17,831,379	203,433,345	343,338,983

TABLE 8.—*Funds allotted to projects approved but not under contract on June 30, 1938*

ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

State	Public Works, 1934–35	Works Program		Federal aid		Total Federal funds	Estimated total cost
		Highways	Grade crossings	Highways 1936–39	Grade crossings		
Alabama				$1,207,550	$83,400	$1,290,950	$2,501,301
Arizona				6,073		6,073	7,592
Arkansas				11,882	110,000	121,882	122,720
California				471,900	144,157	616,057	1,034,011
Colorado				207,350		207,350	372,930
Connecticut				201,510		201,510	405,970
Delaware				275,399		275,399	557,100
Florida				441,423		441,423	882,846
Georgia				794,850		794,850	1,589,700
Idaho				149,208		149,208	249,305
Illinois				1,227,000	226,000	1,453,000	2,680,000
Indiana	$29,686			472,319		502,005	976,900
Iowa				794,300		794,300	1,682,784
Kansas				1,757,860	266,363	2,024,223	3,782,086
Kentucky				949,366	169,402	1,118,768	2,068,134
Louisiana				227,491	134,100	361,591	637,353
Maine	6,550			175,217	201,130	382,927	558,175
Maryland			$130,627	287,175		417,802	720,350
Massachusetts					162,480	162,480	162,480
Michigan		$25,746		186,200	359,900	571,846	918,238
Minnesota				380,570		380,570	770,436
Mississippi	1,650			390,650	103,300	495,600	1,654,990
Missouri				1,229,376		1,229,376	3,071,600
Montana			9,240	142,262		151,502	262,596
Nebraska				375,303	13,880	389,183	766,716
Nevada				334,345		334,345	385,484
New Hampshire				47,327		47,327	94,656
New Mexico				242,840		242,840	398,170
New York			72,000	550,045	211,800	833,845	1,384,490
North Carolina				371,060		371,060	858,404
North Dakota				21,300		21,300	39,770
Ohio				1,535,997	71,710	1,607,707	3,144,125
Oklahoma				1,129,064		1,129,064	2,159,721
Oregon				1,160		1,160	1,897
Pennsylvania				766,419		766,419	1,560,338
Rhode Island			6,781	40,525		47,306	87,831
South Carolina			126,000	307,900	14,820	448,720	873,040
South Dakota				375,870	4,670	380,540	684,814
Tennessee				307,230		307,230	614,460
Texas				902,358	535,345	1,437,703	2,451,498
Utah				150,624	16,100	166,724	231,340
Vermont				107,699		107,699	216,698
Virginia				1,150,293	248,443	1,398,736	2,550,729
Washington		4,746	70,000	32,400	12,902	120,048	166,735
West Virginia				352,932	7,200	360,132	583,860
Wisconsin				708,000		708,000	1,605,672
Wyoming	26,356	20,859		38,427		85,642	109,416
Hawaii		44,644		350,440	197,540	592,624	968,150
Puerto Rico					157,920	157,920	159,001
Total	64,242	95,995	414,648	22,186,519	3,452,562	26,213,966	49,796,642

TABLE 8.—*Funds allotted to projects approved but not under contract on June 30, 1938*—Continued

ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

State	Public Works, 1934-35	Works Program		Federal aid		Total Federal funds	Estimated total cost
		High-ways	Grade crossings	Highways 1936-39	Grade crossings		
Alabama				$79,585		$79,585	$165,480
Arkansas				1,080		1,080	1,320
California			$10,000	246,556		256,556	474,622
Colorado				65,390		65,390	117,630
Delaware				30,851		30,851	62,077
Florida				645,800	$178,800	824,600	1,470,400
Georgia			2,710	60,590		63,300	123,890
Idaho				228,900		228,900	382,517
Illinois	$86,286			95,351		181,637	276,987
Indiana	39,200			9,880		49,080	58,960
Iowa				78,100		78,100	164,885
Kansas		$35,200		13,426	6,600	55,226	68,652
Kentucky				160,579		160,579	321,158
Louisiana				252,661	16,750	269,411	545,926
Maryland				213,655		213,655	446,061
Massachusetts			249,991	117,225		367,216	484,441
Michigan				231,600	132,300	363,900	595,500
Minnesota				64,389	39,540	103,929	169,504
Mississippi	44,550	10,450		4,900		59,900	74,800
Missouri				21,930		21,930	48,350
Nebraska		69,610		170,740		240,350	1,671,089
Nevada				8,763		8,763	10,106
New Mexico		12,196		1,080		13,276	16,452
New York	6,000			21,550		27,550	49,100
North Carolina				22,350	17,420	39,770	62,186
North Dakota				2,318	46,140	48,458	50,470
Ohio				129,678	195,400	325,078	454,755
Oklahoma				1,489		1,489	2,800
Oregon	21,300					21,300	24,211
Pennsylvania				54,500		54,500	108,800
Rhode Island				60,410		60,410	120,820
South Carolina				7,700	291,210	298,910	309,160
South Dakota				330		330	610
Tennessee				24,500		24,500	49,000
Texas	1,952			252,029	458	254,439	521,590
Utah				45,685		45,685	64,080
Virginia	10,503	11,740	1,256	39,735		63,234	104,796
West Virginia				65,156	43,200	108,356	174,806
Wisconsin				63,700		63,700	139,068
Wyoming	570			2,203		2,773	4,139
Total	210,361	139,196	263,957	3,596,364	967,818	5,177,696	9,991,198

ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

State	Public Works, 1934-35	Works Program		Federal aid		Total Federal funds	Estimated total cost
		High-ways	Grade crossings	Secondary or feeder	Grade crossings		
Alabama				$15,600		$15,600	$34,300
Colorado				19,800		19,800	35,630
Connecticut				7,190		7,190	14,380
Georgia		$6,910	$60,200	16,600		83,710	100,310
Idaho				1,181		1,181	3,702
Illinois				21,250		21,250	42,500
Indiana				150		150	300
Kentucky				557		557	1,306
Nebraska			140,000			140,000	140,000
New Jersey			44,730			44,730	44,730
New York					$227,718	227,718	228,468
North Carolina				34,400		34,400	89,900
North Dakota				1,713		1,713	3,200
Pennsylvania		4,700		1,600		6,300	7,900
South Carolina				8,100	12,814	20,914	33,934
Texas				27,307	105,000	132,307	162,129
Virginia				9,423		9,423	65,800
Washington				8,600		8,600	16,371
Wisconsin				500		500	1,353
Total		11,610	244,930	173,971	345,532	776,043	1,026,213

TABLE 8.—*Funds allotted to projects approved but not under contract on June 30 1938*—Continued

ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

State	Public Works, 1934-35	Works Program		Federal aid		Total Federal funds	Estimated total cost
		Highways	Grade crossings	Secondary or feeder	Grade crossings		
Alabama				$108,050		$108,050	$216,100
California				347,128		347,128	651,558
Colorado				47,570		47,570	85,560
Connecticut				16,560		16,560	33,150
Delaware		$17,000				17,000	26,712
Georgia	$73,318	69,030	$5,400	126,850		274,598	404,620
Idaho				52,309		52,309	135,681
Illinois		36,000		413,050		449,050	862,100
Indiana				338,050		338,050	741,953
Kansas				64,900		64,900	129,800
Kentucky				326,745		326,745	1,115,721
Louisiana				147,820		147,820	408,602
Maine				62,400		62,400	124,800
Maryland		69,764				69,764	70,959
Michigan				158,000		158,000	316,000
Missouri				93,420		93,420	278,080
Nebraska				90,594		90,594	191,536
Nevada	13,501			53,422		66,923	76,335
New Hampshire	20,236			74,848		95,084	226,601
New Jersey	51,847			55,855		107,702	200,390
New York				6,250		6,250	12,500
North Carolina				74,500		74,500	188,773
North Dakota				29,157		29,157	54,440
Ohio				5,000		5,000	11,100
Oklahoma				225,521		225,521	442,700
Oregon		11,846		11,850		23,696	31,270
Pennsylvania				313,876		313,876	653,552
Rhode Island				23,481		23,481	48,090
South Carolina	35,500			166,054		201,554	423,485
Tennessee	5,295			59,230		64,525	123,755
Texas		30,809		399,293	$802,100	732,202	1,313,425
Utah				17,000		17,000	32,635
Vermont					22,170	22,170	26,450
Virginia	6,103			181,547		187,650	416,623
Washington				182,600	194,071	376,671	540,803
West Virginia				59,100		59,100	118,200
Wisconsin				69,800		69,800	160,387
Wyoming				38,000		38,000	61,500
Total	205,800	234,449	5,400	4,439,830	518,341	5,403,820	10,955,946

TOTAL

State	Public Works, 1934-35	Works Program		Federal aid			Total Federal funds	Estimated total cost
		Highways	Grade crossings	Highways, 1936-39	Secondary or feeder	Grade crossings		
Alabama				$1,287,135	$123,650	$83,400	$1,494,185	$2,917,181
Arizona				6,073			6,073	7,592
Arkansas				12,962		110,000	122,962	124,040
California			$10,000	718,456	347,128	144,157	1,219,741	2,160,191
Colorado				272,740	67,370		340,110	611,750
Connecticut				201,510	23,750		225,260	453,500
Delaware		$17,000		306,250			323,250	645,889
Florida				1,087,223		178,800	1,266,023	2,353,246
Georgia	$73,318	75,940	68,310	855,440	143,450		1,216,458	2,218,520
Idaho				378,108	53,490		431,598	771,205
Illinois	86,287	36,000		1,322,350	434,300	226,000	2,104,937	3,861,587
Indiana	68,885			482,200	338,200		889,285	1,778,113
Iowa				872,400			872,400	1,847,669
Kansas		35,200		1,771,287	64,900	272,963	2,144,350	3,980,537
Kentucky				1,109,945	327,302	169,402	1,606,649	3,506,319
Louisiana				480,152	147,820	150,850	778,822	1,591,880
Maine	6,550			175,247	62,400	201,130	445,327	682,975
Maryland		69,764	130,627	500,830			701,221	1,237,370
Massachusetts			249,991	117,225		162,480	529,696	646,921
Michigan		25,746		417,800	158,900	492,200	1,093,746	1,829,738
Minnesota				444,959		39,540	484,499	939,940

TABLE 8.—*Funds allotted to projects approved but not under contract on June 30, 1938*—Continued

TOTAL—Continued

State	Public Works, 1934–35	Works Program		Federal aid			Total Federal funds	Estimated total cost
		Highways	Grade crossings	Highways, 1936–39	Secondary or feeder	Grade crossings		
Mississippi	$46,200	$10,450		$395,550		$103,300	$555,500	$1,729,790
Missouri				1,251,306	$93,420		1,344,726	3,398,030
Montana			$9,240	142,262			151,502	262,596
Nebraska		69,610	140,000	546,043	90,594	13,880	860,127	2,769,372
Nevada	13,501			343,108	53,422		410,031	471,925
New Hampshire	20,236			47,327	74,848		142,411	321,257
New Jersey	51,847		44,730		55,855		152,432	245,120
New Mexico		12,196		243,920			256,116	414,622
New York	6,000		72,000	571,595	6,250	439,518	1,095,363	1,674,558
North Carolina				393,410	108,900	17,420	519,730	1,199,263
North Dakota				23,618	30,870	46,140	100,628	147,880
Ohio				1,665,674	5,000	267,110	1,937,784	3,609,980
Oklahoma				1,130,553	225,521		1,356,074	2,605,221
Oregon	21,300	11,846		1,160	11,850		46,156	57,378
Pennsylvania		4,700		820,919	315,476		1,141,095	2,330,590
Rhode Island			6,781	100,935	23,481		131,197	256,741
South Carolina	35,500		126,000	315,600	174,154	318,844	970,098	1,639,619
South Dakota				376,200		4,670	380,870	685,424
Tennessee	5,295			331,730	59,230		396,255	787,215
Texas	1,952	30,809		1,154,387	426,600	942,903	2,556,651	4,448,643
Utah				196,309	17,000	16,100	229,409	328,055
Vermont				107,699		22,170	129,869	273,148
Virginia	16,606	11,740	1,256	1,190,028	190,970	248,443	1,659,043	3,137,948
Washington		4,746	70,000	32,400	191,200	206,973	505,319	723,909
West Virginia				418,088	59,100	50,400	527,588	876,866
Wisconsin				771,700	70,300		842,000	1,906,480
Wyoming	26,926	20,859		40,630	38,000		126,415	175,055
Hawaii		44,644		350,440		197,540	592,624	968,150
Puerto Rico						157,920	157,920	159,001
Total	480,403	481,250	928,935	25,782,883	4,613,801	5,284,253	37,571,525	71,769,999

TABLE 9.—*Balances of funds available for programmed projects on June 30, 1938*

State	Public Works, 1934–35	Works Program		Federal-aid system 1936–39	Federal aid, secondary or feeder	Federal aid, grade crossings	Total
		Highways	Grade crossings				
Alabama	$$83,316	$$2,860	$$9,575	$3,873,445	$721,522	$1,317,985	$6,008,703
Arizona	6,071	88	21,114	1,799,834	463,534	625,495	2,916,136
Arkansas	9,945	7,791	31,283	4,320,542	857,545	1,370,287	6,597,393
California	1,831	36,593	178,412	2,209,182	1,023,734	2,355,669	5,805,421
Colorado	11,371	999,932	32,161	3,038,935	519,275	1,241,823	5,843,497
Connecticut	12,988	39,576	73,681	1,522,970	294,528	844,490	2,788,233
Delaware		31,706	11,043	1,184,277	246,875	416,480	1,890,381
Florida		27,893	162,738	2,724,162	664,791	1,216,381	4,795,965
Georgia	272,391	390,655	1,677,060	5,515,965	943,117	2,399,041	11,198,229
Idaho		3,250	570	1,305,659	286,300	722,876	2,318,655
Illinois	90,488	11,990	45,644	3,272,279	836,849	3,965,468	8,222,718
Indiana	44,396	81,491	10,639	2,596,312	691,438	1,041,793	4,466,069
Iowa		6,468	85,175	1,598,050	1,298,449	1,571,017	4,559,159
Kansas		52,257	73,876	3,576,379	1,208,618	1,600,424	6,511,554
Kentucky	32,990	37,839	44,873	2,255,884	267,692	1,385,321	4,024,599
Louisiana	940	10,723	111,820	2,516,382	540,355	1,279,743	4,459,963
Maine		13,793	23,176	672,327	121,455	254,416	1,085,167
Maryland	13,801	245,743	134,200	1,992,259	409,344	962,247	3,757,594
Massachusetts	195,840	61,291	99,288	2,847,916	643,750	1,680,388	5,528,473
Michigan		6,903		3,450,087	1,365,858	1,847,833	6,670,681
Minnesota	10,245	30,072	65,536	3,528,637	1,198,153	1,775,066	6,607,709
Mississippi	4,847	20,665	98,085	3,443,858	888,927	1,228,151	5,684,533
Missouri	141,913	41,253	35,693	3,963,961	775,403	2,640,043	7,598,266
Montana	3,875		48,184	4,462,564	1,027,170	687,085	6,228,878
Nebraska	15,990	40,577	69,143	2,785,460	662,426	1,438,747	5,012,343
Nevada	1,804		6,789	1,490,200	134,117	308,880	1,941,790
New Hampshire	8	7,905	5,510	1,172,082	121,875	428,575	1,735,955
New Jersey	77,304	29,916	41,538	2,776,553	616,918	1,765,478	5,307,707

TABLE 9.—*Balances of funds available for programmed projects on June 30, 1938*—Continued

State	Public Works, 1934–35	Works Program		Federal-aid system 1936–39	Federal aid, secondary or feeder	Federal aid, grade crossings	Total
		Highways	Grade crossings				
New Mexico	$13,239	$496	$10,632	$1,134,063	$476,579	$729,050	$2,364,059
New York	113,241	524,519	269,313	4,248,388	1,171,081	4,485,311	10,811,853
North Carolina	278	1,764	178,986	3,388,863	619,115	1,918,474	6,107,480
North Dakota	13,541	34,878	59,186	3,813,287	756,382	982,545	5,659,819
Ohio	55,747	127,214	261,553	7,760,747	1,734,441	3,929,938	13,869,640
Oklahoma	4,719	17,199	108,713	3,387,789	896,907	2,264,166	6,679,493
Oregon	9,104	28,945	24,943	2,326,410	458,070	650,276	3,497,748
Pennsylvania	254,651	125,229	287,202	6,093,096	1,126,751	5,448,625	13,335,554
Rhode Island				1,158,499	121,875	269,853	1,550,227
South Carolina	3,498	1	208,529	1,866,336	261,064	1,085,621	3,425,049
South Dakota	3,277	13,983	62,527	3,442,676	816,436	1,098,084	5,436,983
Tennessee		10,076	222,383	4,938,008	876,457	1,877,652	7,924,576
Texas	37,387	49,092	129,422	8,602,515	1,938,768	4,360,065	15,117,249
Utah		34,704	25,903	1,721,289	317,130	444,955	2,543,981
Vermont		10,820	15,254	294,747	121,687	249,659	692,167
Virginia	19,321	90,884	57,121	1,119,840	473,986	1,210,472	2,971,624
Washington	714	15,216	805	1,350,405	311,791	718,301	2,397,232
West Virginia		28,417	6,418	2,518,310	386,574	876,844	3,816,563
Wisconsin			116,227	2,161,311	859,453	1,361,722	4,498,713
Wyoming		314	38,366	893,056	313,373	517,316	1,762,425
District of Columbia						325,431	325,431
Hawaii	30,788			1,198,792	218,750	296,210	1,744,540
Puerto Rico				671,985	124,925	510,830	1,307,740
Total	1,591,859	3,352,981	5,280,289	139,986,573	33,211,613	73,982,602	257,405,917

TABLE 10.—*Mileage of projects completed during the fiscal year 1938*

ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

State	Federal aid, 1917–33	Public Works, 1934–35	Works Program		Federal aid		Total
			Highways	Grade crossings	Highways, 1936–39	Grade crossings	
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Alabama		1.0			67.9		68.9
Arizona				0.7	114.7		115.4
Arkansas			1.2	2.8	182.2		186.2
California			5.9	3.0	154.2		163.1
Colorado				1.6	133.8		135.4
Connecticut		1.1		2.0	9.4		12.5
Delaware					21.0		21.0
Florida		2.3	4.0	1.3	32.4		40.0
Georgia		21.3	7.0	5.5	154.6		188.4
Idaho			.5	1.2	206.0		207.7
Illinois				2.0	305.7		307.7
Indiana			8.6	1.7	146.0	0.1	156.4
Iowa				2.8	233.1	.9	236.8
Kansas			14.5	8.0	255.1		277.6
Kentucky			3.6	1.7	91.4		96.7
Louisiana			13.4	6.5	15.0		34.9
Maine			1.4	1.0	57.9		60.3
Maryland			3.0		14.9		17.9
Massachusetts			.8	.9	20.3		22.0
Michigan				.9	160.8		161.7
Minnesota		1.1		1.1	326.4		328.6
Mississippi		12.5	10.4	33.2	155.5		211.6
Missouri				8.5	462.6		471.1
Montana				.5	319.5		320.0
Nebraska			3.2	4.4	351.7		359.3
Nevada					128.8		128.8
New Hampshire			.5	.2	6.9		7.6
New Jersey		3.9			19.0		22.9
New Mexico		1.2		.4	365.5		367.1
New York		.5	.6	7.0	268.4		276.5
North Carolina		11.8	18.0	10.3	391.1	.4	431.6
North Dakota		36.2	12.7	33.3	184.2		266.4
Ohio		1.4	13.3	3.3	70.9		88.9
Oklahoma	23.1		4.4	3.2	216.9		247.6

TABLE 10.—*Mileage of projects completed during the fiscal year 1938*—Continued

ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES—Con.

State	Federal aid, 1917-33	Public Works, 1934-35	Works Program		Federal aid		Total
			Highways	Grade crossings	Highways, 1936-39	Grade crossings	
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Oregon			2.6	1.0	166.2	1.8	171.6
Pennsylvania		6.5	21.4	12.3	197.4		237.6
Rhode Island					10.5		10.5
South Carolina		1.9		17.2	277.4		296.5
South Dakota			26.2	51.7	231.4		309.3
Tennessee			13.8	1.8	87.8		103.4
Texas	8.1		.3	1.1	1,054.5		1,064.0
Utah				1.3	138.3		139.6
Vermont				1.5	38.7		40.2
Virginia		11.8		1.7	175.3		188.8
Washington					77.7	.3	78.0
West Virginia		.7	6.3	3.3	41.8		52.1
Wisconsin			2.7	6.4	260.1		269.2
Wyoming			.1	1.1	318.0		319.2
Hawaii		1.1			13.3		14.4
Total	31.2	116.3	200.4	249.4	8,732.2	3.5	9,333.0

ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

		Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Alabama		0.9		1.2	2.8		4.9
Arizona					.9		.9
Arkansas		.5	17.4	1.2	6.5		25.6
California			3.0	.3	4.2		7.5
Colorado					1.4		1.4
Connecticut		.3	1.7		.7		2.7
Delaware			6.0				6.0
Florida		.5	2.0	1.1	5.6		9.2
Georgia		4.7	2.3	1.1	6.7		14.8
Idaho		1.9		.7	5.8		8.4
Illinois		.2		2.1	31.2		33.5
Indiana			2.0	2.7	7.0		11.7
Iowa			.7	2.5	16.2		19.4
Kansas			.7	1.2	4.8		6.7
Kentucky			.8	2.4	3.7		6.9
Louisiana			2.0	.6			2.6
Maine			.1		4.5		4.6
Maryland		2.0					2.0
Massachusetts		.1	5.0	.7			5.8
Michigan				.5	13.1		13.6
Minnesota		1.3	2.1	1.3	25.1	1.5	31.3
Mississippi		.3	19.0	2.0	12.8		34.1
Missouri		.9	4.1	2.0	28.3		35.3
Montana					4.1		4.1
Nebraska		.4	1.0	1.7	4.9		8.0
Nevada					3.7	.2	3.9
New Hampshire				.1	.3		.4
New Jersey			4.7	.4			5.1
New Mexico				.3	.2		.5
New York		.8	5.8	1.0	13.7		21.3
North Carolina			1.4	1.3	14.9		17.6
North Dakota		.3	17.4	2.2	2.3		22.2
Ohio		.7	1.0	.5	2.8		5.0
Oklahoma			2.5	1.3	3.4		7.2
Oregon		.7	3.8	1.1	4.0	.7	10.3
Pennsylvania		3.0	2.6	4.1	8.8		18.5
Rhode Island					.8		.8
South Carolina		2.7	8.8	2.6	9.5		23.6
South Dakota			11.6	4.2	3.8		19.6
Tennessee			1.6	.9	2.5		5.0
Texas		1.0	1.1	1.7	22.2		26.0
Utah			2.5	.4	12.1		15.0
Vermont			.4	.1	5.8		6.3
Virginia		.4	2.6	5.2	5.7	.2	14.1
Washington				.3	1.8		2.1
West Virginia		.1	2.9	1.2	3.6		7.8
Wisconsin			.3		21.3		21.6
Wyoming		.3		.2	3.7		4.2
District of Columbia						.2	.2
Total		24.0	140.9	54.4	337.2	2.8	559.3

TABLE 10.—*Mileage of projects completed during the fiscal year 1938*—Continued

ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

State	Public Works, 1934–35	Works Program		Federal aid		Total
		Highways	Grade crossings	Secondary or feeder	Grade crossings	
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Alabama		1.3	0.7			2.0
Arkansas		1.2	1.2			2.4
California		5.8	1.2	1.0		8.0
Colorado			.8			.8
Connecticut		1.4	.3			1.7
Florida		2.8	.6			3.4
Georgia		7.7	1.9			9.6
Idaho			.3	9.5		9.8
Illinois		3.9	.5			4.4
Indiana		5.5	1.2		0.5	7.2
Iowa		.8	.6			1.4
Kansas		.7				.7
Kentucky		1.8	.3	.8		2.9
Louisiana		2.8	.3			3.1
Maine		1.9		6.0		7.9
Michigan			.5			.5
Minnesota		9.5	1.6			11.1
Missouri		1.7	.8	8.9		11.4
Montana		1.1				1.1
Nebraska		3.2	1.1	.3		4.6
Nevada		.3	.2			.5
New Hampshire		2.8	.1			2.9
New Jersey		1.9	2.5			4.4
New Mexico			.1			.1
New York		.5	.8	7.2		8.5
North Carolina		5.0	2.1	4.8		11.9
North Dakota			1.0			1.0
Ohio		6.2	.4			6.6
Oklahoma		6.1	.7			6.8
Oregon				.1		.1
Pennsylvania		35.8	2.1			37.9
Rhode Island			.2			.2
South Dakota		.9	1.0			1.9
Tennessee		.5	2.2			2.7
Texas			2.8			2.8
Utah		10.3	1.0		.9	12.2
Virginia		.4	.1			.5
Washington		1.2	1.2		.1	2.5
West Virginia			.8			.8
Wisconsin		.6	1.2			1.8
Wyoming			.4			.4
Total		125.6	34.8	38.6	1.5	200.5

ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Alabama		22.5	2.1			24.6
Arizona		7.3	.5	9.9		17.7
Arkansas	11.1	23.7	.4			35.2
California		11.1	.6	36.2		47.9
Colorado			.2			.2
Connecticut		14.9	.4			15.3
Delaware		10.3				10.3
Florida		3.7	10.4			14.1
Georgia	4.9	49.3	2.6	3.2		60.0
Idaho			.5	33.6		34.1
Illinois	9.3	40.3	.7	3.3		53.6
Indiana		66.0	1.6			67.6
Iowa		70.1	4.8		0.9	75.8
Kansas		20.7		24.4		45.1
Kentucky		12.5	.6	104.3		117.4
Louisiana	17.2	11.3	.7			29.2
Maine	.9	11.4	1.6	9.4		23.3
Maryland		6.6	2.9			9.5
Massachusetts		9.7	3.7			13.4
Michigan		1.4	.6			2.0
Minnesota	10.5	45.9	4.8			61.2
Mississippi	1.1	26.7	10.8			38.6
Missouri	.3	12.8	.7	237.6		251.4
Montana	.1	8.9				9.0

TABLE 10.—*Mileage of projects completed during the fiscal year 1938*—Continued

ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES—Continued

State	Public Works, 1934–35	Works Program		Federal aid		Total
		Highways	Grade crossings	Secondary or feeder	Grade crossings	
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Nebraska	6.3	31.0	.5	8.6		46.4
Nevada		1.7		26.5		28.2
New Hampshire		7.7	1.3			9.0
New Jersey	1.1	12.6	1.0			14.7
New Mexico		33.8				33.8
New York		17.6	2.1	11.8		31.5
North Carolina		43.2	1.8	41.5		86.5
North Dakota		27.5	.2			27.7
Ohio		104.0	6.0			110.0
Oklahoma		16.2	2.4			18.6
Oregon	.7	3.6	.8	36.4	.2	41.7
Pennsylvania	5.2	105.3	3.8	5.9		120.2
Rhode Island				3.3		3.3
South Carolina	8.1	30.3	1.6			40.0
South Dakota	6.9	34.5	7.1			48.5
Tennessee		22.2	6.5			28.7
Texas		21.3	1.5	25.6	4.6	53.0
Utah		21.1	.8	4.8	6.4	33.1
Vermont		1.3	.2	4.3		5.8
Virginia	21.0	57.3	1.7	11.7	.9	92.6
Washington	.2	.6	.4	18.0		19.2
West Virginia	3.3	43.3	.5			47.1
Wisconsin		5.7	1.2	6.7		13.6
Wyoming		12.5		7.2		19.7
Hawaii		7.0				7.0
Total	108.2	1,148.4	92.6	674.2	13.0	2,036.4

TOTAL

State	Federal aid, 1917–33	Public Works, 1934–35	Works Program		Federal aid			Total
			Highways	Grade crossings	Highways 1936–39	Secondary or feeder	Grade crossings	
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Alabama		1.9	23.7	4.0	70.7			100.3
Arizona			7.3	1.2	115.6	9.9		134.0
Arkansas		11.7	43.5	5.6	188.7			249.5
California			25.8	5.1	158.4	37.2		226.5
Colorado				2.6	135.2			137.8
Connecticut		1.5	18.0	2.6	10.1			32.2
Delaware			16.3		21.0			37.3
Florida		2.9	12.4	13.4	38.0			66.7
Georgia		30.9	66.2	11.1	161.4	3.2		272.8
Idaho		1.9	.5	2.8	211.8	43.1		260.1
Illinois		9.5	44.2	5.2	337.0	3.3		399.2
Indiana			82.0	7.2	153.1		0.6	242.9
Iowa			71.6	10.8	249.2		1.8	333.4
Kansas			36.7	9.2	259.8	24.4		330.1
Kentucky			18.7	5.0	95.2	105.1		224.0
Louisiana		17.2	29.6	8.1	15.0			69.9
Maine		.9	14.8	2.6	62.4	15.4		96.1
Maryland		2.0	9.6	2.8	15.0			29.4
Massachusetts		.1	15.5	5.2	20.3			41.1
Michigan			1.5	2.4	174.0			177.9
Minnesota		12.9	57.4	9.0	351.3		1.6	432.2
Mississippi		13.8	56.1	46.0	168.4			284.3
Missouri		1.1	18.6	12.0	490.9	246.5		769.1
Montana		.1	10.1	.5	323.5			334.2
Nebraska		6.7	38.4	7.7	356.6	8.9		418.3
Nevada			2.0	.2	132.5	26.5	.2	161.4
New Hampshire			10.9	1.9	7.1			19.9
New Jersey		5.0	19.3	3.9	19.0			47.2
New Mexico		1.2	33.8	.8	365.7			401.5
New York		1.4	24.4	11.0	282.0	19.0		337.8
North Carolina		11.8	67.6	15.4	406.0	46.4	.4	547.6
North Dakota		36.5	57.6	36.7	186.5			317.3

TABLE 10.—*Mileage of projects completed during the fiscal year 1938*—Contd.

TOTAL—Continued

State	Federal aid, 1917–33	Public Works, 1934–35	Works Program		Federal aid			Total
			Highways	Grade crossings	Highways 1936–39	Secondary or feeder	Grade crossings	
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Ohio		2.0	124.5	10.2	73.7			210.4
Oklahoma	23.1		29.2	7.7	220.2			280.2
Oregon		1.4	10.0	3.0	170.2	36.4	2.7	223.7
Pennsylvania		14.7	165.1	22.3	206.2	5.9		414.2
Rhode Island				.1	11.3	3.3		14.7
South Carolina		12.6	39.1	21.4	287.0			360.1
South Dakota		6.9	73.3	64.0	235.2			379.4
Tennessee			38.1	11.3	90.3			139.7
Texas	8.1	1.0	22.9	7.1	1,076.7	25.6	4.5	1,145.9
Utah			34.0	3.5	150.3	4.8	7.3	199.9
Vermont			1.7	1.7	44.5	4.3		52.2
Virginia		33.1	60.3	8.8	181.0	11.7	1.1	296.0
Washington		.2	1.8	1.9	79.6	18.0	.4	101.9
West Virginia		4.2	52.5	5.7	45.4			107.8
Wisconsin			9.3	8.8	281.4	6.7		306.2
Wyoming		.3	12.4	1.7	321.7	7.2		343.3
Hawaii		1.1	7.0		13.3			21.4
District of Columbia							.2	.2
Total	31.2	248.5	1,615.3	431.2	9,069.4	712.8	20.8	12,129.2

TABLE 11.—*Mileage of projects under contract on June 30, 1938*

ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

State	Public Works, 1934–35	Works Program		Federal aid		Total
		Highways	Grade crossings	Highways, 1936–39	Grade crossings	
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Alabama		1.3		274.2		275.5
Arizona				103.0		103.0
Arkansas		4.0	8.0	74.5	17.4	103.9
California				237.7	1.3	239.0
Colorado		2.8		79.8		82.6
Connecticut			.4	11.5		11.9
Delaware		.2	.3	18.0		18.5
Florida				68.2		68.2
Georgia	1.9	15.1	7.9	351.1		376.0
Idaho				176.3	.6	176.9
Illinois			.7	241.5	1.2	243.4
Indiana	.9			163.0	3.1	167.0
Iowa				217.0	2.5	219.5
Kansas				674.0	5.7	679.7
Kentucky			1.0	215.2		216.2
Louisiana		.1	1.1	88.2	5.7	95.1
Maine			.4	54.2	.1	54.7
Maryland	2.1	6.2	.1	37.5		45.9
Massachusetts		.5	.1	7.6		8.2
Michigan			.3	128.4	.1	128.8
Minnesota			.4	232.0	.1	232.5
Mississippi	2.6		1.0	300.2	.1	303.9
Missouri				154.6	1.7	156.3
Montana			.4	70.3	10.2	80.9
Nebraska			1.6	625.8	7.0	634.4
Nevada				93.3	.6	93.9
New Hampshire				23.1	.6	23.7
New Jersey			.3	15.2		15.5
New Mexico				201.1	14.9	216.0
New York		.2		272.2	5.9	278.3
North Carolina			.5	317.6	2.3	320.4
North Dakota	15.5			208.1		223.6
Ohio			2.2	85.5		87.7
Oklahoma		.4	.3	204.1		204.8
Oregon				92.0	.2	92.2
Pennsylvania			5.4	113.1	.7	119.2
Rhode Island				13.0	.3	13.3

TABLE 11.—*Mileage of projects under contract on June 30, 1938*—Continued

ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES—Continued

State	Public Works, 1934–35	Works Program		Federal aid		Total
		Highways	Grade crossings	Highways, 1936–39	Grade crossings	
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
South Carolina	1.0		1.4	236.7	.1	239.2
South Dakota	13.1	.5	.5	361.4	.6	376.1
Tennessee				161.4		161.4
Texas				776.8		776.8
Utah				100.8	1.1	101.9
Vermont				42.4	2.1	44.5
Virginia				183.1	1.0	184.1
Washington		.7		87.3	.9	88.9
West Virginia	.1		1.1	54.4	.7	56.3
Wisconsin	.1			168.3	4.5	172.9
Wyoming				250.6	1.1	251.7
Hawaii			.5	18.6		19.1
Puerto Rico				20.5	.4	20.9
Total	37.3	32.0	35.9	8,704.4	94.8	8,904.4

ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Alabama	1.5		1.0	15.4	0.6	18.5
Arizona				.3		.3
Arkansas			.4	1.4	1.2	3.0
California				22.8	.6	23.4
Colorado				1.4		1.4
Connecticut			.5	1.7		2.2
Delaware				.7		.7
Florida				2.0		2.0
Georgia	5.8	12.8	.4	35.3		54.3
Idaho				.9		.9
Illinois	.1		.8	18.1	.7	19.7
Indiana	.2			19.3		19.5
Iowa		.3	1.5	11.0	.7	13.5
Kansas	.2	.7	1.3	14.3	1.1	17.6
Kentucky	.8	1.2	.6	4.9	.4	7.9
Louisiana		1.3	6.0	1.2		8.5
Maine				9.1	.2	9.3
Maryland	.8	1.7				2.5
Massachusetts				3.4		3.4
Michigan		.3	.1	12.1		12.5
Minnesota	.2		.3	30.6	.5	31.6
Mississippi	.1	2.5	.4	35.7	.1	38.8
Missouri		.6	.1	7.3	.8	8.8
Montana		.1		.4	.5	1.0
Nebraska		1.1	.3	12.7	.6	14.7
Nevada				.3		.3
New Hampshire				1.4		1.4
New Jersey				6.1		6.1
New York	.4	.2	.2	20.1		20.9
North Carolina		.2		17.0		17.2
North Dakota	.8	22.4		3.1	.1	26.4
Ohio		.6	1.4	10.2		12.2
Oklahoma			.1	6.2		6.3
Oregon				4.8	.5	5.3
Pennsylvania	.1	3.3	2.0	10.8		16.2
Rhode Island				1.7		1.7
South Carolina	.4	2.2	.7	21.5		24.8
South Dakota	.8	12.9	1.5	4.9		20.1
Tennessee				6.2		6.2
Texas		2.9	.6	17.7		21.2
Utah				6.2		6.2
Vermont				.5		.5
Virginia			1.3	4.3	1.0	6.6
Washington				2.1		2.1
West Virginia	2.3		.2	5.2	.5	8.2
Wisconsin				24.9		24.9
Wyoming	.6		.5	.4		1.5
Total	15.1	67.3	22.2	437.6	10.1	552.3

TABLE 11.—*Mileage of projects under contract on June 30, 1938*—Continued

ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

State	Public Works, 1934-35	Works Program		Federal aid		Total
		Highways	Grade crossings	Secondary or feeder	Grade crossings	
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Alabama				0.7	0.7	1.4
California					.3	.3
Colorado			0.3	.4		.7
Georgia		1.34	2.0	1.5		16.9
Idaho				.1		.1
Illinois		.8	.3	4.5		5.6
Indiana				.3		.3
Kansas				.5		.5
Kentucky			.1	.4		.5
Louisiana			.7			.7
Maine				3.2		3.2
Maryland			.4			.4
Massachusetts					.1	.1
Minnesota				.8	1.9	2.7
Mississippi		1.6	.1		.1	1.8
Missouri			.3	.3		.6
Montana			.1		.2	.3
Nebraska		1.3	.6	2.0	.3	4.2
New Jersey			.2		.2	.4
New York		.1	.7	1.1		1.9
North Carolina		.5	.5	4.3		5.3
North Dakota			.1		.1	.2
Ohio		1.0	1.1			2.1
Oklahoma		4.0	.4	1.3		5.7
Oregon				.4		.4
Pennsylvania		5.6	.5	1.6		7.7
South Carolina		9.6	.9	.6		11.1
South Dakota			.4		.2	.6
Tennessee		2.0	.7			2.7
Texas		6.0		4.4	.8	11.2
Utah				1.4		1.4
Vermont				1.4		1.4
Washington				3.6	.6	4.2
West Virginia			.6		.3	.9
Wisconsin			.4	1.4		1.8
Wyoming				6.0		6.0
Total		45.9	11.4	42.2	5.8	105.3

ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Alabama		6.5	0.1	23.1	1.4	31.1
Arizona				18.6		18.6
California				52.7		52.7
Colorado		6.0		29.1		35.1
Connecticut			.6			.6
Florida			.5			.5
Georgia	6.4	80.6	7.5	42.7		137.2
Idaho			.5	12.3		12.8
Illinois	6.1	10.8	.2	113.7		130.8
Indiana			1.1	61.7	4.5	67.3
Kansas		10.2		.6		10.8
Kentucky		2.3		76.9		79.2
Louisiana	1.2	10.4		5.0		16.6
Maine		.8		15.0	1.6	17.4
Maryland	6.2	7.5	1.9			15.6
Massachusetts		.5	.5			1.0
Michigan		3.3				3.3
Minnesota	.2			44.7		44.9
Mississippi	5.2					5.2
Missouri				44.0		44.0
Montana	3.5	4.4				7.9
Nebraska		4.5		67.2		71.7
Nevada				46.2		46.2
New Hampshire		5.7		1.8		7.5
New Jersey			.9			.9
New Mexico				30.7		30.7
New York	.2	1.0	.1	146.9	1.7	149.9
North Carolina		4.9	.9	72.3	.6	78.7
North Dakota	4.0	16.2			.3	20.5
Ohio		2.2	1.5	3.7		7.4
Oklahoma	.4	1.6		8.8		10.8

TABLE 11.—*Mileage of projects under contract on June 30, 1938*—Continued

ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES—Continued

State	Public Works, 1934–35	Works Program		Federal aid		Total
		Highways	Grade crossings	Secondary or feeder	Grade crossings	
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Oregon	.2		.1	56.6		56.9
Pennsylvania	1.0	5.6	.3	91.1	.4	98.4
Rhode Island				3.2		3.2
South Carolina	7.7	13.1		62.5		83.3
South Dakota	6.2	.4	17.4		1.0	25.0
Tennessee		9.5	.3	12.6		22.4
Texas	.4	.1		223.9	2.2	226.6
Utah				31.6		31.6
Vermont				10.1	.7	10.8
Virginia	7.3	14.5		43.7	4.8	70.3
Washington			.5	28.0	.6	29.1
West Virginia	10.5	4.3	.5	16.5	.6	32.4
Wisconsin				22.8	.4	23.2
Wyoming				37.8		37.8
Hawaii				2.4		2.4
Puerto Rico				13.7		13.7
Total	66.7	226.9	35.4	1,574.2	20.8	1,924.0

TOTAL

State	Public Works, 1934–35	Works Program		Federal aid			Total
		High-ways	Grade cross-ings	High-ways, 1936–39	Second-ary or feeder	Grade cross-ings	
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Alabama	1.5	7.8	1.1	289.6	23.8	2.8	326.6
Arizona				103.3	18.6		121.9
Arkansas		4.0	8.4	75.9		18.6	106.9
California				260.5	52.7	2.1	315.3
Colorado		8.8	.4	81.1	29.5		119.8
Connecticut			1.5	13.1			14.6
Delaware		.2	.3	18.6			19.1
Florida			.5	70.2			70.7
Georgia	14.1	121.8	17.8	386.5	44.2		584.4
Idaho			.6	177.2	12.3	.6	190.7
Illinois	6.2	11.6	2.0	259.6	118.1	2.0	399.5
Indiana	1.2		1.1	182.2	62.0	7.7	254.2
Iowa		.3	1.5	228.1		3.1	233.0
Kansas	.2	11.0	1.2	688.2	1.1	6.9	708.6
Kentucky	.7	3.5	1.8	220.1	77.3	.4	303.8
Louisiana	1.2	11.8	7.7	89.4	5.0	5.7	120.8
Maine		.8	.4	63.3	18.2	1.9	84.6
Maryland	9.1	15.3	2.4	37.6			64.4
Massachusetts		1.0	.6	11.0		.1	12.7
Michigan		3.6	.4	140.5		.1	144.6
Minnesota	.4		.7	262.6	45.5	2.5	311.7
Mississippi	7.9	4.0	1.5	335.9		.3	349.6
Missouri		.6	.4	161.9	44.4	2.5	209.8
Montana	3.5	4.4	.4	70.9		10.8	90.0
Nebraska		7.0	2.5	638.5	69.2	7.8	725.0
Nevada				93.7	46.1	.6	140.4
New Hampshire		5.6		24.6	1.8	.6	32.6
New Jersey			1.5	21.2		.2	22.9
New Mexico				201.1	30.7	14.9	246.7
New York	.6	1.5	1.0	292.3	148.0	7.6	451.0
North Carolina		5.6	1.8	334.7	76.6	2.9	421.6
North Dakota	20.3	38.7	.1	211.2		.5	270.8
Ohio		3.7	6.3	95.6	3.8		109.4
Oklahoma	.4	6.0	.9	210.2	10.1		227.6
Oregon	.2		.1	96.7	57.0	.7	154.7
Pennsylvania	1.2	14.4	8.1	123.8	92.8	1.2	241.5
Rhode Island				14.7	3.2	.3	18.2
South Carolina	9.1	24.9	3.0	258.2	63.1	.1	358.4
South Dakota	20.0	13.8	19.7	366.5		1.8	421.8
Tennessee		11.6	1.0	167.6	12.6		192.8
Texas	.4	9.2	.6	794.4	228.2	3.0	1,035.8
Utah				107.0	33.0	1.1	141.1

TABLE 11.—*Mileage of projects under contract on June 30, 1938*—Continued

TOTAL—Continued

State	Public Works, 1934-35	Works Program		Federal aid			Total
		Highways	Grade crossings	Highways, 1936-39	Secondary or feeder	Grade crossings	
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Vermont				42.9	11.6	2.8	57.3
Virginia	7.3	14.6	1.3	187.4	43.7	6.7	261.0
Washington		.7	.5	89.5	31.6	2.1	124.4
West Virginia	12.9	4.3	2.5	59.5	16.5	2.1	97.8
Wisconsin	.1		.3	193.3	24.2	4.9	222.8
Wyoming	.6		.5	251.0	43.8	1.1	297.0
Hawaii			.5	18.6	2.4		21.5
Puerto Rico				20.5	13.7	.4	34.6
Total	119.1	372.1	104.9	9,142.0	1,616.4	131.5	11,486.0

TABLE 12.—*Mileage of projects approved but not under contract on June 30, 1938*

ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

State	Public Works, 1934-35	Works Program		Federal aid		Total
		Highways	Grade crossings	Highways, 1936-39	Grade crossings	
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Alabama				111.8	0.2	112.0
Arkansas				4.0	.5	4.5
California				20.7	.4	21.1
Colorado				9.5		9.5
Connecticut				3.6		3.6
Delaware				4.7		4.7
Florida				19.8		19.8
Georgia				76.9		76.9
Idaho				15.7		15.7
Illinois				76.9	.7	77.6
Indiana	0.3			10.4		10.7
Iowa				63.6		63.6
Kansas				215.2	8.6	223.8
Kentucky				37.0	1.0	38.0
Louisiana				1.8	7.4	9.2
Maine	.1			6.4	4.7	11.2
Maryland			0.4	11.1		11.5
Massachusetts					.6	.6
Michigan				7.1	4.2	11.3
Minnesota				78.8		78.8
Mississippi				80.0	.1	80.1
Missouri				126.6		126.6
Montana			.1	8.3		8.4
Nebraska				64.7	2.5	67.2
Nevada				64.1		64.1
New Hampshire				1.4		1.4
New Mexico				38.0		38.0
New York				12.7	.4	13.1
North Carolina				54.6		54.6
North Dakota				8.0		8.0
Ohio				20.3	1.4	21.7
Oklahoma				68.9		68.9
Pennsylvania				21.2		21.2
Rhode Island				.3		.3
South Carolina			.5	35.7		36.2
South Dakota				66.1	.5	66.6
Tennessee				16.1		16.1
Texas				86.8	11.9	98.7
Utah				21.5		21.5
Vermont				6.7		6.7
Virginia				63.1	.5	63.6
Washington			.6	.3		.9
West Virginia				11.4	.1	11.5
Wisconsin				51.1		51.1
Wyoming				7.6		7.6
Hawaii		0.7		8.7	1.6	11.0
Puerto Rico					.6	.6
Total	.4	.7	1.6	1,719.2	47.9	1,769.8

TABLE 12.—*Mileage of projects approved but not under contract on June 30, 1938*—Continued

ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

State	Public Works, 1934–35	Works Program		Federal aid		Total
		Highways	Grade crossings	Highways, 1936–39	Grade crossings	
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Alabama				7.2		7.2
California			0.2	2.9		3.1
Colorado				1.3		1.3
Delaware				.4		.4
Florida				.7	0.2	.9
Georgia				9.0		9.0
Idaho				.3		.3
Illinois				4.2		4.2
Indiana	0.4			.3		.7
Iowa				1.8		1.8
Kansas		0.3		.7	.2	1.2
Kentucky				2.6		2.6
Louisiana				.3	2.0	2.3
Maryland				.2		.2
Massachusetts			.4	2.2		2.6
Michigan				3.2	.8	4.0
Minnesota				6.3		6.3
Mississippi	.5	.1		1.3		1.9
Missouri				1.8		1.8
Nebraska		1.8		4.8		6.6
New Mexico				.2		.2
New York				.7		.7
North Carolina				.9	.1	1.0
North Dakota				.8	.6	1.4
Ohio				1.2	.1	1.3
Oklahoma				.5		.5
Oregon	.2					.2
Pennsylvania				1.4		1.4
Rhode Island				1.0		1.0
South Carolina				1.2	.6	1.8
South Dakota				.1		.1
Tennessee				.5		.5
Texas				7.8		7.8
Utah				8.0		8.0
Virginia	.3	.2		2.5		3.0
West Virginia				1.5	.3	1.8
Wisconsin				5.5		5.5
Wyoming				.3		.3
Total	1.4	2.4	.6	85.6	4.9	94.9

ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

State	Public Works, 1934–35	Works Program		Federal aid		Total
		Highways	Grade crossings	Secondary or feeder	Grade crossings	
		Miles	*Miles*	*Miles*	*Miles*	*Miles*
Alabama				1.9		1.9
Colorado				.4		.4
Connecticut				.3		.3
Georgia		0.4	0.2	4.6		5.2
Idaho				.5		.5
Illinois				4.8		4.8
Indiana				.1		.1
Kentucky				.3		.3
Nebraska			.6			.6
New Jersey			.1			.1
New York					0.1	.1
North Carolina				10.3		10.3
North Dakota				.5		.5
Pennsylvania		.2				.2
South Carolina				1.9		1.9
Texas				4.3	.3	4.6
Virginia				.3		.3
Washington				1.7		1.7
Wisconsin				.1		.1
Total		.6	.9	32.0	.4	33.9

TABLE 12.—*Mileage of projects approved but not under contract on June 30, 1938*—Continued

ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

State	Public Works, 1934–35	Works Program		Federal aid		Total
		Highways	Grade crossings	Secondary or feeder	Grade crossings	
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Alabama				18.2		18.2
California				28.2		28.2
Colorado				3.6		3.6
Connecticut				.6		.6
Delaware		4.4				4.4
Georgia	0.5	4.3	0.1	27.8		32.7
Idaho				32.2		32.2
Illinois				70.8		70.8
Indiana				65.8		65.8
Kansas				25.7		25.7
Kentucky				104.9		104.9
Louisiana				28.5		28.5
Maine				6.7		6.7
Maryland		1.6				1.6
Michigan				26.3		26.3
Missouri				31.1		31.1
Nebraska				38.7		38.7
Nevada	1.7			7.9		9.6
New Hampshire				3.9		3.9
New Jersey	1.1			1.9		3.0
New York				.1		.1
North Carolina				10.9		10.9
North Dakota				8.5		8.5
Ohio				.9		.9
Oklahoma				39.7		39.7
Oregon		.9		2.1		3.0
Pennsylvania				36.9		36.9
Rhode Island				2.9		2.9
South Carolina	1.4			46.7		48.1
Tennessee	2.6			2.6		5.2
Texas		8.6		124.1	0.6	133.3
Utah				1.6		1.6
Vermont					.2	.2
Virginia				21.8		21.8
Washington				30.9	.4	31.3
West Virginia				9.4		9.4
Wisconsin				6.4		6.4
Wyoming				5.1		5.1
Total	7.3	19.8	.1	873.4	1.2	901.8

TABLE 12.—*Mileage of projects approved but not under contract on June 30, 1938*—Continued

TOTAL

State	Public Works, 1934–35	Works Program		Federal aid			Total
		Highways	Grade crossings	Highways, 1936–39	Secondary or feeder	Grade crossings	
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Alabama				118.9	20.1	0.2	139.2
Arkansas				4.0		.5	4.5
California			0.2	23.6	28.2	.4	52.4
Colorado				10.9	4.0		14.9
Connecticut				3.6	.9		4.5
Delaware		4.4		5.1			9.5
Florida				20.5		.2	20.7
Georgia	0.5	4.7	.4	85.9	32.3		123.8
Idaho				16.0	32.7		48.7
Illinois				81.1	75.5	.7	157.3
Indiana	.7			10.7	65.9		77.3
Iowa				65.4			65.4
Kansas		.3		216.0	25.7	8.8	250.8
Kentucky				39.5	105.3	1.0	145.8
Louisiana				2.1	28.4	9.4	39.9
Maine	.1			6.4	6.7	4.7	17.9
Maryland		1.6	.4	11.3			13.3
Massachusetts			.4	2.2		.6	3.2
Michigan				10.3	26.2	5.0	41.5
Minnesota				85.1			85.1
Mississippi	.6	.1		81.1		.1	81.9
Missouri				128.4	31.1		159.5
Montana			.1	8.3			8.4
Nebraska		1.8	.6	69.5	38.7	2.5	113.1
Nevada	1.7			64.1	7.9		73.7
New Hampshire				1.4	3.9		5.3
New Jersey	1.0		.1		1.9		3.0
New Mexico				38.2			38.2
New York				13.4	.1	.5	14.0
North Carolina				55.6	21.3	.1	77.0
North Dakota				8.8	9.0	.5	18.3
Ohio				21.6	.9	1.5	24.0
Oklahoma				69.4	39.7		109.1
Oregon	.2	1.0			2.0		3.2
Pennsylvania		.2		22.5	36.9		59.6
Rhode Island				1.2	3.0		4.2
South Carolina	1.4		.5	36.8	48.7	.7	88.1
South Dakota				66.2		.5	66.7
Tennessee	2.6			16.7	2.6		21.9
Texas		8.6		94.6	128.4	12.8	244.4
Utah				29.5	1.6		31.1
Vermont				6.7		.2	6.9
Virginia	.3	.2		65.6	22.1	.5	88.7
Washington			.5	.3	32.6	.5	33.9
West Virginia				13.1	9.4	.3	22.8
Wisconsin				56.5	6.6		63.1
Wyoming				7.9	5.1		13.0
Hawaii		.6		8.8		1.6	11.0
Puerto Rico						.6	.6
Total	9.1	23.5	3.2	1,804.8	905.4	54.4	2,800.4

TABLE 13.—*Status of grade-crossing elimination and protection projects on June 30, 1938*

COMPLETED DURING FISCAL YEAR

State	Crossings eliminated						Separation structures reconstructed			Crossings protected					
	Public Works, 1934–35	Works Program		Federal aid		Total	Works Program grade crossings	Federal-aid grade crossings	Total	Public Works, 1934–35	Works Program		Federal aid		Total
		Highways	Grade crossings	Highways, 1936–39	Grade crossings						Highways	Grade crossings	Highways, 1936–39	Grade crossings	
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Alabama			11		1	12									
Arizona			2			2						5			5
Arkansas			16			16	2		2			29			29
California			16			16									
Colorado			9			9	2		2			21		1	22
Connecticut			6			6						1			1
Florida	1		12			13	1		1			29			29
Georgia	1		25	1		27	4		4	1		24			25
Idaho			9	1		10	1		1			13			13
Illinois	1		15	1		17	5	2	7	63					63
Indiana			20	3	2	25	1		1	19		130			149
Iowa			28		4	32	2	3	5			1		1	2
Kansas			11			11					1	3		3	7
Kentucky			9			9	6		6	4					4
Louisiana			16			16	2		2						
Maine			5			5	2		2			2			2
Maryland			4			4	1		1			16			16
Massachusetts			14	3		17	2		2				4		4
Michigan			6			6	2		2						
Minnesota			11		1	12	2		2			14	1	16	31
Mississippi			23			23	3		3	2		19			21
Missouri			29	1		30	1		1						
Montana			1			1									
Nebraska			15			15	1		1			16			16
Nevada			1			1		1	1						
New Hampshire			7			7	1		1			6			6
New Jersey	1		14			15	5		5						
New Mexico			7			7				1					1
New York	4	1	16	1		22	26		26						
North Carolina			26			26	3		3						
North Dakota			28			28	2		2						

Ohio			16			16	7		7			11			11
Oklahoma			19			19	8		8			38			38
Oregon			7		3	10	1		1						
Pennsylvania			36	1		37	10		10						
Rhode Island							1		1						
South Carolina			21			21	7		7			39			39
South Dakota			35			35	2		2			26		15	41
Tennessee			28			28	1		1			19			19
Texas			27	1	3	31	2		2			107			107
Utah			13		2	15								2	2
Vermont			3			3	2		2			5		5	10
Virginia			14		2	16	8	3	11	1		14			15
Washington			2	2	2	6	2	1	3		1	3			4
West Virginia			15			15	3		3			2			2
Wisconsin			10	4		14	2		2			10			10
Wyoming			5			5									
District of Columbia								1	1						
Total	8	1	663	19	20	711	133	11	144	91	2	603	5	43	744

UNDER CONTRACT

Alabama			4		8	12								6	6
Arkansas			3		7	10						2			2
California				1	3	4		4	4	47					47
Colorado			3		1	4								4	4
Connecticut			4			4									
Delaware			2			2								23	23
Florida			1	1		2						45			45
Georgia	1		22			23	13		13			33			33
Idaho			1		1	2						1			1
Illinois	1		13	2	8	24							1	1	2
Indiana			1		6	7		6	6			32		86	118
Iowa			8		12	20		1	1					21	21
Kansas			5		12	17	1		1					6	6
Kentucky			3		1	4	3		3	5				31	36
Louisiana			7	2	2	11	1		1				1		1
Maine			1		2	3		2	2					1	1
Maryland	1		5		1	7	1		1			13			13
Massachusetts		1	2			3		1	1						
Michigan			1		8	9	1	1	2					45	45
Minnesota			3		2	5		5	5					1	1
Mississippi			4		3	7	2		2			3			3
Missouri		1	5		6	12									
Montana			1		6	7	1		1						
Nebraska			2		11	13									
Nevada				1		1		3	3			5		2	7
New Hampshire								1	1			1			1
New Jersey			3	1	2	6	2	1	3						

TABLE 13.—*Status of grade-crossing elimination and protection projects on June 30, 1938*—Continued

UNDER CONTRACT—Continued

State	Crossings eliminated						Separation structures reconstructed			Crossings protected					
	Public Works, 1934–35	Works Program		Federal aid		Total	Works Program grade crossings	Federal-aid grade crossings	Total	Public Works, 1934–35	Works Program		Federal aid		Total
		Highways	Grade crossings	Highways, 1936–39	Grade crossings						Highways	Grade crossings	Highways, 1936–39	Grade crossings	
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
New Mexico					4	4						1			1
New York			7		8	15	2	4	6					2	2
North Carolina			12		4	16		2	2			115			115
North Dakota					1	1	1	2	3						
Ohio			40			40						1			1
Oklahoma			2	1		3									
Oregon			1		1	2		2	2						
Pennsylvania			15	1	2	18	5		5						
Rhode Island					1	1									
South Carolina	1		4			5	4	1	5			6		22	28
South Dakota			21		3	24		1	1					10	10
Tennessee			4			4	1		1			1			1
Texas			1		2	3						5			5
Utah					2	2								4	4
Vermont					6	6		1	1					1	1
Virginia			4		12	16		2	2			1		3	4
Washington			1	1	5	7		3	3					4	4
West Virginia			12		4	16						1		3	4
Wisconsin			1	4	10	15	1		1			24			24
Wyoming			1			1		2	2					6	6
Hawaii			2			2									
Puerto Rico					2	2									
Total	4	2	232	15	169	422	39	45	84	52		290	2	282	626

APPROVED BUT NOT UNDER CONTRACT

State	Crossings eliminated					Separation structures reconstructed		
	Public Works 1934-35	Works Program grade crossings	Federal aid		Total	Works Program grade crossings	Federal-aid grade crossings	Total
			Highways, 1936-39	Grade crossings				
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Alabama				1	1			
Arkansas				1	1			
California		5		1	6			
Florida				1	1			
Georgia		1			1			
Illinois	1			2	3			
Kansas				5	5			
Kentucky				2	2			
Louisiana			1	4	5			
Maine				3	3			
Maryland						1		1
Massachusetts		1		1	2			
Michigan				4	4			
Minnesota							1	1
Mississippi				1	1			
Montana						1		1
Nebraska		1		2	3			
New Jersey						1		1
New York							3	3
North Carolina							2	2
North Dakota				1	1			
Ohio				4	4			
South Carolina				2	2	2	1	3
Texas			1	9	10		2	2
Utah				1	1			
Vermont							1	1
Virginia				2	2			
Washington		1	1	3	5			
West Virginia			1		1			
Hawaii				3	3		1	1
Puerto Rico				2	2			
Total	1	9	4	55	69	5	11	16

TABLE 14.—*Mileage, by types of construction, of projects completed during the fiscal year 1938*

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Grade separations		Total
		Untreated	Treated	Untreated	Treated	Untreated	Treated							Railroad and highways	Between-highways	
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Alabama	12.3	4.3	18.4	7.7	50.3						0.8		6.2	0.3		100.3
Arizona				20.0	78.5			26.5			8.4		.6			134.0
Arkansas	25.8			24.9	.7		1.8	120.5		2.9	71.4		.9	.6		249.5
California					24.7			118.4		42.9	39.0		1.0	.5		226.5
Colorado				116.8				4.4		.1	14.5		.9	1.1		137.8
Connecticut					17.5				9.5	1.6	3.3		.2	.1		32.2
Delaware				10.3						10.3	16.7					37.3
Florida	33.1		.4				10.9			.1	21.7		.2	.3		66.7
Georgia	9.2	7.4	32.1	58.7	51.9		51.0				59.0	0.8	1.7	1.0		272.8
Idaho	19.9			90.2				139.3	4.1	.3	5.4		.3	.6		260.1
Illinois	119.6			12.5		79.4	14.9	3.6		.2	165.6		2.7	.7		399.2
Indiana	77.7			24.5	6.5		20.0	9.5		4.0	97.5		.9	2.3		242.9
Iowa	75.2			6.9							249.0		1.2	1.1		333.4
Kansas	28.4	13.2		187.9				37.0			61.3		1.8	.5		330.1
Kentucky	10.0			137.7				17.3		4.3	53.5		1.0	.2		224.0
Louisiana	17.1		4.6	14.3	1.0						30.5		.9	1.5		69.9
Maine				15.7	44.4				19.0	14.8	2.0			.2		96.1
Maryland				6.5			.9			.5	21.2		.2	.1		29.4
Massachusetts								1.3	9.9	26.9			.1	2.8	0.1	41.1
Michigan				12.6						13.8	150.7	.3	.4	.1		177.9
Minnesota	108.5			80.7	24.5			114.5		2.1	101.4		.3	.2		432.2
Mississippi	119.1		8.9	38.5	2.3					9.1	104.2		1.8	.4		284.3
Missouri	37.9			231.8	266.7			23.9		23.7	181.2		2.4	1.5		769.1
Montana	50.6			136.5	49.1			96.2					1.7	.1		334.2
Nebraska	32.4	53.9	22.1					270.7			37.0		1.1	1.1		418.3
Nevada			.8	39.9	5.0			109.8		5.6			.3			161.4
New Hampshire							14.3	1.1	3.2	.1	.9		.2	.1		19.9
New Jersey				10.1	1.1				4.3	2.4	28.0		.2	1.0	.1	47.2
New Mexico	37.1			108.6	78.5			175.0			.4		1.9			401.5
New York	6.1			6.0	41.5				21.8	65.1	193.0	.3	1.3	2.6	.1	337.8
North Carolina	21.6	56.1	172.9	47.6	85.3		4.7	54.7		9.4	93.8		1.2	.3		547.6
North Dakota	55.1			105.4	54.1			101.2			.4	.3	.1	.7		317.3
Ohio	15.1			99.9	.4	3.1	2.4			17.2	38.8	32.1	.9	.5		210.4
Oklahoma	24.8			106.4	5.6					27.9	112.9		1.8	.8		280.2
Oregon	6.8			11.7	71.4	.2	11.2	27.7	59.7	14.2	19.6		.6	.6		223.7
Pennsylvania	4.6			74.9					61.1	39.2	225.6	6.2	1.5	.8		414.2

Rhode Island					2.9				1.0	2.2	8.6					14.7
South Carolina	41.0	29.1	246.7	3.8				5.9		14.5	17.7		.9	.5		360.1
South Dakota	112.9			53.8	58.8			100.1			52.9		.4	.5		379.4
Tennessee	2.9			65.2					5.3	12.9	49.7	2.0	1.0	.7		139.7
Texas	270.9			146.0	417.0		10.9			21.4	268.5	3.0	7.6	.6		1,145.9
Utah	1.7			65.9	5.7			112.9		6.3	6.9		.2	.3		199.9
Vermont				.3	12.4		1.6	23.4	2.6		11.6		.2	.1		52.2
Virginia	5.9		28.0	52.5	31.0		139.3			9.3	24.0		.9	5.1		296.0
Washington	3.7			53.3				9.0	6.1	2.3	25.5		.9	1.1		101.9
West Virginia	38.0			7.7		5.0	18.5	5.9		10.2	21.2		.5	.8		107.8
Wisconsin	44.4			71.8				13.1		.9	174.5		.8	.7		306.2
Wyoming	35.8			30.0	9.9			266.2					.7	.7		343.3
Hawaii	.9				1.6		13.2		5.3				.4			21.4
District of Columbia										.2						.2
Total	1,506.1	164.0	534.9	2,395.5	1,500.3	87.7	315.9	1,989.1	212.9	418.9	2,869.8	45.0	53.0	35.8	.3	12,129.2

TABLE 15.—*Mileage, by types of construction, of projects under contract on June 30, 1938*

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Grade separations		Total
		Untreated	Treated	Untreated	Treated	Untreated	Treated							Railroad and highways	Between highways	
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Alabama		7.1	175.0	7.3	131.3		1.5			0.2	1.9		2.1	0.2		326.6
Arizona				6.7	61.4			53.1					.7			121.9
Arkansas	30.2			5.1				68.5			2.6		.3	.2		106.9
California	1.8			11.8	21.9			125.0	14.7	78.8	57.9		2.8	.6		315.3
Colorado	1.1			117.9						.3			.5			119.8
Connecticut					.3		7.0		.9		6.2			.2		14.6
Delaware										.2	18.7			.2		19.1
Florida	39.9				6.3		.4	1.3			21.9		.9			70.7
Georgia	9.8	31.6	90.8	94.1	173.4		90.7			23.5	66.3		3.4	.8		584.4
Idaho	7.8			59.5				118.2		.1	4.8		.2	.1		190.7
Illinois	100.6	8.1		25.8	6.1	118.8		19.0		3.1	111.7	1.5	3.7	1.1		399.5
Indiana	21.0			26.9				37.4		40.7	126.9		1.0	.3		254.2
Iowa	37.6			.6							193.1		.6	1.1		233.0
Kansas	14.4		21.2	63.2	473.5			98.6			33.0		2.5	2.2		708.6
Kentucky	10.6			93.2				89.9		20.3	88.4		1.1	.3		303.8
Louisiana	63.0			5.0							48.5		3.9	.3	0.1	120.8
Maine				.8	39.0		16.9		10.3	10.5	7.0		.1			84.6
Maryland	1.5			3.1		.3			6.3	.6	52.2		.1	.3		64.4
Massachusetts	1.9							.6	1.7	7.3	.5		.3	.4		12.7
Michigan	13.4			8.8						14.4	107.3		.6	.1		144.6
Minnesota	28.8	9.6		17.5	15.6			202.7			36.5		.3	.6	.1	311.7
Mississippi	42.1			5.4	16.6						284.1		.7	.7		349.6
Missouri	33.9			76.2	46.3					5.7	44.5		2.2	.8	.2	209.8
Montana	21.5			23.0				44.6			.2		.6	.1		90.0
Nebraska	86.8	87.1	242.3					244.0			56.3		8.1	.4		725.0
Nevada				88.6				51.7						.1		140.4
New Hampshire							20.8	5.0		3.5	3.1		.2			32.6
New Jersey	2.4				.8					.3	19.3			.1		22.9
New Mexico	14.8			93.6	15.7			121.3					1.3			246.7
New York	52.7			5.7	134.6		5.4	16.2	13.5	25.8	195.2		1.3	.6		451.0
North Carolina	64.9	.7	121.9	17.8	87.0		9.5	57.6		2.8	54.5		4.7	.2		421.6
North Dakota	88.3	.3		19.7	47.3			114.4			.4		.4			270.8
Ohio	.5			11.6		2.4	.1			15.3	47.2	31.0	.6	.7		109.4
Oklahoma	15.9			125.7	2.3			13.1	6.3	3.3	58.0		2.3	.7		227.6
Oregon	5.9			52.1	64.8		7.1		5.7	4.2	13.9		.9	.1		154.7
Pennsylvania				45.9			18.1		44.5	56.7	72.9	1.9	.7	.8		241.5
Rhode Island								3.2	3.7	5.2	6.1					18.2

South Carolina	11.5	28.5	208.7		41.1			17.7		23.0	25.7		2.0	.2		358.4
South Dakota	199.7			7.0	67.0			147.1					.8	.2		421.8
Tennessee				75.7						54.9	60.8		1.0	.4		192.8
Texas	234.6			187.6	351.3			8.5		88.1	142.0	14.6	8.4	.6	.1	1,035.8
Utah	.2			43.9	8.9			74.0		4.2	9.9					141.1
Vermont				.6	14.2			39.2			3.1		.1	.1		57.3
Virginia	3.0	5.7	48.8	10.2	27.4		61.5			31.6	71.3		1.1	.4		261.0
Washington	4.0			87.4				14.0		.2	17.0		1.5	.3		124.4
West Virginia	8.8			5.6			12.0	26.8		28.4	15.2		.1	.9		97.8
Wisconsin	85.7			72.0				6.6		.3	56.8		1.2	.2		222.8
Wyoming	113.7			25.2				157.4					.6	.1		297.0
Hawaii							20.8		.4				.3			21.5
Puerto Rico							34.2						.2	.2		34.6
Total	1,474.3	178.7	908.7	1,627.8	1,854.1	121.5	306.0	1,976.7	108.0	553.5	2,242.9	49.0	66.4	17.9	.5	11,486.0

TABLE 16.—*Mileage, by types of construction, of projects approved but not under contract on June 30, 1938*

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Grade separations		Total
		Untreated	Treated	Untreated	Treated	Untreated	Treated							Railroad and highways	Between highways	
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Alabama			44.8	13.5	79.8						0.2		0.9			139.2
Arkansas				4.0							.4			0.1		4.5
California	4.6		1.0	2.4	5.5			29.4		5.7	3.5		.3			52.4
Colorado				11.4							.4		.1			14.9
Connecticut							0.8		0.9		2.8					4.5
Delaware	4.5									3.4	1.4		.2			9.5
Florida	7.2						6.2				6.8		.5			20.7
Georgia	13.7	16.3	24.8	13.0	11.0	2.1	11.8			17.8	12.6		.6	.1		123.8
Idaho				9.5				38.9					.3			48.7
Illinois	33.9			27.5		53.0		8.3			34.3		.1		0.2	157.3
Indiana	9.0			19.3	3.4			34.2			11.4					77.3
Iowa	8.4				17.0						39.7		.3			65.4
Kansas	78.7		13.7	66.8	54.8			18.0			17.8		1.0			250.8
Kentucky	8.8			102.3				5.0		6.8	21.8		1.0	.1		145.8
Louisiana	9.3			28.0							1.6		.8	.2		39.9
Maine					3.1		10.7		3.4	.2	.5					17.9
Maryland	1.8			.7							10.7				.1	13.3
Massachusetts									.4	2.8						3.2
Michigan	8.5			12.1				7.1		3.0	10.8					41.5
Minnesota	10.3	4.2		.2	13.4			57.0								85.1
Mississippi	51.1										30.0		.7	.1		81.9
Missouri	17.0			42.1	46.3		31.1				19.7		.3			159.5
Montana	8.3							.1								8.4
Nebraska	15.8	38.6	42.7					9.9			4.5		.9	.7		113.1
Nevada				12.8				60.9								73.7
New Hampshire							4.3			1.0						5.3
New Jersey										1.1	1.8		.1			3.0
New Mexico				11.2				26.8					.2			38.2
New York	3.8			.1							10.1					14.0
North Carolina	3.2		7.1		39.1			18.4			9.1		.1			77.0
North Dakota		9.0						9.3								18.3
Ohio				.9			6.1				7.2	9.4	.1	.2	.1	24.0
Oklahoma	7.9			73.3						9.7	16.5		1.7			109.1
Oregon				1.0			2.0			.1	.1					3.2
Pennsylvania				27.7					12.5	2.8	16.6					59.6
Rhode Island									2.9	.9	.4					4.2
South Carolina	10.6	14.7	59.8							2.3	.3		.2	.2		88.1

South Dakota	45.0							21.6					.1			66.7
Tennessee				5.0						.9	15.8		.2			21.9
Texas	66.6			46.7	104.2			4.3		16.2	2.8		2.2	1.4		244.4
Utah				5.7				24.8			.6					31.1
Vermont					.2			6.7								6.9
Virginia	2.7		13.4	5.0	18.0	.1	21.9			11.1	16.0		.4	.1		88.7
Washington				22.3	11.1					.5						33.9
West Virginia					4.9		4.5			7.1	5.7		.1	.5		22.8
Wisconsin	1.3			25.0							36.6		.2			63.1
Wyoming	5.0							7.9					.1			13.0
Hawaii							10.2		.6				.2			11.0
Puerto Rico							.4							.2		.6
Total	437.0	82.8	207.3	592.5	411.8	55.2	113.0	388.6	20.7	93.4	370.5	9.4	13.9	3.9	.4	2,800.4

CONSTRUCTION OF ROADS THROUGH PUBLIC LANDS AND FEDERAL RESERVATIONS

Special authorizations and appropriations have been made by Congress for the survey, construction, reconstruction, and maintenance of main roads through unappropriated or unreserved public lands, nontaxable Indian lands, and Federal reservations other than the forest reservations, where such land is more than 5 percent of the total area of the State. There are 14 of these Federal-land States, all of which are situated west of the Mississippi River. The percentage of such lands in the several States varies considerably, and reaches a maximum of approximately 73 percent in Nevada.

The construction of highways across these relatively large areas that do not contribute to State revenues imposes a serious burden on State highway funds.

The Federal-land highways differ from the Forest highways and the Federal-aid highways in that there is no Federal-land highway system. Federal-land funds may be expended on roads which are on the Federal-aid system or on main roads not on the Federal-aid system. Contributions from the States are not required to be used in conjunction with Federal-land funds, but cooperative funds from the States may be used. Federal-land funds are sometimes expended under the supervision of State highway departments, following Federal-aid procedure, and sometimes under the direct supervision of the Bureau.

Special authorizations for the construction of roads in public lands have been made by seven congressional acts, passed up to the end of the fiscal year 1938. These authorizations, totaling $20,000,000, have made funds available for each fiscal year from 1931 through 1939, excepting 1932 and 1937. In addition $1,000,000 has been authorized for the fiscal year 1940, and $2,000,000 for the fiscal year 1941.

Federal-land projects, in large part, involve the grading and draining of new roads and the reconstruction of old roads to greater widths and to higher standards of grade and alinement. Most of these roads are subsequently improved by the addition of gravel and bituminous surfacing, in the effort to spread the relatively small funds over a considerable mileage of road. Very little mileage of the higher types of surface such as bituminous concrete and portland-cement concrete has been constructed.

During the fiscal year 116 miles of initial improvement and 146 miles of further improvement of roads previously improved were completed. The total improved mileage now existing is 1,458 miles. Tables 17, 18, 19, and 20 show details concerning the work completed during the year and the status at the end of the year.

Early in the fiscal year the bridge across the Colorado River near Parker, Ariz., was completed and opened to traffic. This bridge, with its approaches, is approximately a half mile in length.

Notable from the standpoint of continuous Federal-land construction during the fiscal year 1938 are: the Flagstaff-Fredonia highway, in Arizona, and the Ely-Tonopah highway, in Nevada.

TABLE 17.—*Public-lands funds allotted to projects completed during the fiscal year 1938*

State	Public-lands funds	Estimated total cost	Miles	State	Public-lands funds	Estimated total cost	Miles
Arizona	$127,476	$129,079	39.0	Oklahoma	$23,162	$23,162	0.1
California	277,232	387,742	20.0	Oregon	168,722	187,443	16.4
Idaho	159,656	163,004	22.6	South Dakota	75,924	76,217	8.1
Nevada	718,375	744,926	106.0	Utah	180,606	180,815	17.1
New Mexico	265,575	266,631	10.4				
North Dakota	31,619	31,619	22.8	Total	2,028,347	2,190,638	262.5

TABLE 18.—*Public-lands funds allotted to projects under contract and under construction, June 30, 1938*

State	Public-lands funds	Estimated total cost	Miles	State	Public-lands funds	Estimated total cost	Miles
Arizona	$190,843	$190,843	34.1	South Dakota	$3,144	$3,144	0.3
Montana	159,129	164,891	14.0	Utah	25,260	25,260	9.4
Nevada	374,511	374,511	54.1	Wyoming	142,390	142,390	23.1
New Mexico	107,744	107,744	13.0				
Oklahoma	28,935	37,708	.1	Total	1,031,956	1,046,491	148.1

TABLE 19.—*Public-lands funds allotted to projects approved but not under contract and balance available for programmed projects, June 30, 1938*

State	Public-lands funds	Estimated total cost	Miles	Balance available for new projects	State	Public-lands funds	Estimated total cost	Miles	Balance available for new projects
Arizona	$123,920	$123,920	13.8	$400,614	Oklahoma				$28,777
California	18,469	18,469	7.7	464,183	Oregon	$86,406	$86,406	7.1	80,990
Colorado	88,688	106,870	9.5	88,629	South Dakota				108,651
Idaho				137,534	Utah				308,176
Montana				136,937	Washington	38,349	40,889	2.5	38,507
Nevada	174,886	174,886	25.0	209,305	Wyoming				241,131
New Mexico				215,856					
North Dakota				102,026	Total	530,718	551,440	65.6	2,561,316

TABLE 20.—*Mileage of Federal-lands roads, by types of construction, completed as of June 30, 1938*

State	Graded and drained	Gravel		Macadam, treated	Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Bridges	Total
		Untreated	Treated							
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Arizona	12.4		32.1		80.8				0.5	125.8
California	.3	13.8	19.7		60.2				.3	94.3
Colorado		14.9			7.9				.1	22.9
Idaho	9.2	46.8			31.5					87.5
Montana	19.1	18.2			18.2				.2	55.7
Nevada		20.8			454.4				.1	475.3
New Mexico		18.3	10.8		28.8			6.0	.3	64.2
North Dakota	9.5	16.1								25.6
Oklahoma					5.6		1.8	2.5	.1	10.0
Oregon	3.5	130.6	5.8	4.0					.1	144.0
South Dakota	15.7	2.8	1.2							19.7
Utah		44.4			129.7		6.8		.1	181.0
Washington	.4	14.3				2.6		3.7		21.0
Wyoming	8.8		15.6		106.7				.3	131.4
Total	78.9	341.0	85.2	4.0	923.8	2.6	8.6	12.2	2.1	1,458.4

The Flagstaff-Fredonia highway is 73 miles in length, and is a part of U. S. Route 89, a heavily traveled north-south highway. A bituminous surfacing was placed on this route for a distance of 46 miles. At the close of the fiscal year, 26 miles of the route were being improved with bituminous surfacing.

The Ely-Tonopah highway, in Nevada, a Federal-land route 102 miles in length, is part of U. S. Route 6, which carries traffic directly across the State. Three Federal-land projects on this route were completed. A gravel surfacing was converted to bituminous surfacing for a distance of 37 miles, and 9 miles were graded and gravel-surfacing placed preparatory to constructing a bituminous surface.

RESTORATION OF FLOOD-DAMAGED ROADS

Funds for reconstruction of flood-damaged roads and bridges in 11 States were authorized by special acts during the period 1928–31 and this work is still active in three States. All authorized funds have been absorbed in completed work in Florida, New Hampshire, South Carolina, and Vermont. All work planned in Alabama, Georgia, Louisiana, and Mississippi has been completed.

During the year 12 miles of flood-relief construction was completed. At the close of the year 32 miles was under contract; 14 miles had been approved but contracts had not been awarded, as shown in table 21; and three States had unobligated balances as follows: Kentucky, $148,195; Arkansas, $187,762; and Missouri, $1,232.

TABLE 21.—*Status of flood-relief funds provided under special flood-relief acts*

Status and State	Flood relief funds	Estimated total cost	Miles
Completed:			
Kentucky	$93,059	$213,005	12.2
Under contract:			
Arkansas	86,458	173,467	25.1
Kentucky	69,275	138,550	7.3
Total	155,733	312,017	32.4
Approved but contracts not awarded:			
Arkansas	48,086	96,173	.2
Kentucky	103,308	206,616	10.8
Missouri	7,330	14,660	3.4
Total	158,724	317,449	14.4

The Bureau has continued to supervise other flood-relief projects at the request of the Works Progress Administration. These projects are financed by the W. P. A. and the States and, in some cases, partly with Works Program funds administered by the Bureau. The work consists of the reconstruction of flood-damaged bridges and approaches, for the most part on secondary roads. In this work, which is done by contract, the Bureau cooperates closely with the State highway departments much the same as on Federal-aid construction.

During the year 28.8 miles of bridges and approaches costing $8,103,776 was completed, bringing the total of this class of work completed to date to 34.9 miles costing $9,380,072. Work under contract or approved for contract aggregated 3.3 miles estimated to cost $3,449,678, as shown in table 22.

TABLE 22.—*Status of funds allotted for reconstruction of flood-damaged bridges by the Works Progress Administration to be supervised by the Bureau of Public Roads*

Status and State	Works Progress flood reconstruction funds	Estimated total cost	Miles	Status and State	Works Progress flood reconstruction funds	Estimated total cost	Miles
Completed:				Under contract:			
Connecticut	$175,699	$324,920	0.8	Massachusetts	$1,237,808	$2,290,166	1.6
Maine	1,629,262	1,927,370	3.3	New Hampshire	123,750	165,000	.1
Massachusetts	1,254,175	1,696,730	4.7	Pennsylvania	444,603	629,500	1.3
New Hampshire	500,024	671,963	1.4	Vermont	41,689	91,012	.1
Pennsylvania	2,727,333	3,123,121	16.6				
Vermont	41,190	74,672	.5	Total	1,847,850	3,175,678	3.1
West Virginia	142,500	285,000	1.5				
				Approved but contract not awarded:			
Total	6,470,183	8,103,776	28.8	West Virginia	68,500	274,000	.2

Federal funds to aid the States in the immediate repair of highways and bridges on the Federal-aid system damaged by floods or other forces of nature have been made available by two congressional acts. The Hayden-Cartwright Act of June 18, 1934, authorized the Secretary of Agriculture to use an amount not to exceed $10,000,000, from any funds available for expenditure under the Federal Highway Act, in the repair and reconstruction of flood-damaged highways and bridges on the Federal-aid system, and authorized future appropriation of funds expended for such purposes. An additional $8,000,000 was provided by the Federal-Aid Highway Act of 1938, approved June 8, 1938. These acts make possible the immediate repair of damaged roads without waiting for specific authorization of funds. The States are required to match these funds in the same manner as regular Federal-aid funds.

Work financed by the above authorization was completed on 31.3 miles in 9 States, costing $2,079,954 and involving $972,749 of Federal funds. Work estimated to cost $2,722,998 and involving $1,396,850 of Federal funds was under contract or approved, as shown in table 23. Flood-damage funds paid to the States amounted to $1,047,513, bringing the total paid to the States under the Hayden-Cartwright Act to $2,569,876. Funds paid to States during the fiscal year were as follows:

Kansas	$165,838	Ohio	$314,659
Kentucky	38,515	Texas	90,473
Maine	3,328	Vermont	41,844
Maryland	86,789	Virginia	76,794
Nebraska	46,456		
New Hampshire	37,364	Total	1,047,513
New York	145,453		

TABLE 23.—*Status of flood-relief funds provided under section 3 of the Hayden-Cartwright Act*

Status and State	Emergency relief funds	Estimated total cost	Miles	Status and State	Emergency relief funds	Estimated total cost	Miles
Completed:				Under contract—Con.			
Kansas	$287,106	$629,339	0.5	Maryland	$124,319	$266,639	0.7
Kentucky	31,332	62,664	3.1	Ohio	509,200	1,018,400	7.4
Maryland	9,900	20,615	.1	Vermont	36,350	72,700	2.2
New Hampshire	65,294	131,078	.3				
New York	126,886	308,485	.1	Total	783,036	1,584,073	11.2
Ohio	260,001	537,188	23.9				
Texas	113,036	226,072	.2	Approved but contract not awarded:			
Vermont	59,914	125,953	2.4	California	353,413	611,004	12.9
Virginia	19,280	38,560	.7	Maryland	68,500	137,000	.1
				Missouri	5,500	14,800	.2
Total	972,749	2,079,954	31.3	Ohio	109,220	221,760	1.1
				Virginia	77,181	154,361	.2
Under contract:							
Kansas	98,996	197,992	.2	Total	613,814	1,138,925	14.5
Kentucky	14,171	28,342	.7				

Including work completed in previous years the total obligations to the end of the fiscal year amounted to $7,879,000, leaving a balance of $2,121,000 for new projects, from funds provided by the Hayden-Cartwright Act. The $8,000,000 provided by the Federal Aid Highway Act of 1938 became available at the end of the year and no part of this fund has been obligated.

WORK-RELIEF HIGHWAY PROJECTS

Work-relief highway projects, begun in the fall of 1933 to relieve distress in drouth-stricken areas, have been continued since in areas needing special relief. Road work has been carried on by an arrangement under which the Public Works Administration has granted funds to pay material and equipment costs, limited to not more than 30 percent of the total expenditure, and the labor has been supplied from relief rolls and paid first by the Federal Emergency Relief Administration and later by the Works Progress Administration.

The Bureau, cooperating with the respective State highway departments, has assumed the responsibility of supervising road work under this arrangement.

During the year 365 miles of work of this kind costing $2,300,490 was completed, bringing the total to date to 6,366 miles. At the close of the year work was under contract on 1,092 miles, estimated to cost $9,381,947, as shown in table 24.

TABLE 24.—*Status of National Recovery work-relief projects*

Status and State	Federal funds	Total cost	Miles	Status and State	Federal funds	Total cost	Miles
Completed:				Under contract:			
Kansas	$57,180	$192,237	48.5	Minnesota	$743,892	$3,725,311	28.9
Minnesota	57,474	208,103	30.6	Oklahoma	570,000	2,000,000	442.7
Texas	561,586	1,900,150	286.1	Texas	1,064,145	3,656,636	620.8
Total	676,240	2,300,490	365.2	Total	2,378,037	9,381,947	1,092.4

LOAN-AND-GRANT HIGHWAY PROJECTS

The P. W. A. has continued the policy of financing or aiding, by loans or grants or both, the construction of roads and bridges in a number of States. Projects of this kind are initiated by their sponsors with the P. W. A. and, after agreement has been reached and funds allotted, are turned over to the Bureau for detailed administration of construction. Practically all of this work is done by the contract method.

This work was begun in 1934 with funds provided by the National Industrial Recovery Act and has been continued with funds allocated under authorization of the Emergency Relief Appropriation Act of 1935. Up to the close of the year, loans and grants of $56,436,272 had been made for specific projects 9,478 miles in length and estimated to cost $126,391,251. This represents a net increase during the year of 438 miles involving $4,798,385 of loan-and-grant funds and estimated to cost $12,612,490. Table 25 shows details by States.

TABLE 25.—*Status on June 30, 1938, of loan-and-grant Public Works projects transferred by the Public Works Administration to the Bureau of Public Roads for supervision and audit*

ALLOTMENTS FROM NATIONAL INDUSTRIAL RECOVERY ACT

State	Funds allotted by Public Works Administration			Mileage, estimated cost, and funds assigned to specific projects approved under Public Works Administration allotments				
	Tentative allotment by Special Board for Public Works	Allotment by contracts executed		Miles	Estimated total cost	Funds assigned		
		Grant	Loan			Grant	Loan	Other
Alabama	$70,247.99	$20,617.28	$49,630.71	6.7	$70,247.99	$20,617.28	$49,630.71	
California	1,310,863.65	1,310,863.65		16.4	6,063,238.26	1,310,863.65		$4,752,374.61
Connecticut	1,207,595.74	1,207,595.74		68.7	4,825,941.10	1,207,595.74		3,618,345.36
Illinois	2,418,911.71	2,418,911.71		97.6	8,176,459.46	2,377,251.02		5,799,208.44
Indiana	200,662.04	200,662.04		34.5	765,293.83	200,662.04		564,631.79
Iowa	307,586.75	307,586.75		823.6	1,061,690.12	307,586.75		754,103.37
Kansas	5,119,129.85	1,524,129.85	3,595,000.00	410.0	5,686,101.24	1,524,129.85	3,595,000.00	566,971.39
Louisiana	269,258.33	88,258.33	181,000.00	47.3	300,515.08	88,258.33	181,000.00	31,256.75
Maryland	5,411,866.00	1,411,866.00	4,000,000.00	72.1	5,090,357.16	1,408,168.25	3,541,100.08	141,088.83
Massachusetts	1,702,395.00	1,702,395.00		105.1	5,449,602.94	1,616,939.64		3,832,663.30
Michigan	10,000.00	10,000.00		29.0	39,818.00	10,000.00		29,818.00
Minnesota	1,337,211.57	952,211.57	385,000.00	472.9	3,261,752.07	952,211.57	385,000.00	1,924,540.50
Mississippi	559,135.62	161,149.30	397,986.32	85.2	505,607.99	151,682.38	344,475.26	9,450.35
Missouri	1,026,000.00	1,026,000.00		50.6	3,473,587.39	1,026,000.00		2,447,587.39
Montana	1,829,000.00	579,000.00	1,250,000.00	697.8	1,955,462.56	579,000.00	1,250,000.00	126,462.56
Nebraska	11,500.00	11,500.00		59.5	40,120.22	11,500.00		28,620.22
New York	736,814.48	375,033.67	361,780.81	30.9	1,282,140.00	375,033.67	361,780.81	545,325.52
Ohio	793,179.87	139,877.63	653,302.24	27.1	995,847.75	139,877.63	653,302.24	202,667.88
South Carolina	76,082.97	21,283.31	54,799.66	28.1	76,082.97	21,283.31	54,799.66	
Texas	1,471,020.71	931,420.71	539,600.00	238.3	3,254,907.27	931,420.71	539,600.00	1,783,886.56
Washington	2,270,571.22	2,270,571.22		1,275.2	8,209,057.61	2,270,571.22		5,938,486.39
West Virginia	2,000,000.00	2,000,000.00		453.8	6,755,786.02	1,997,850.82		4,757,935.20
Wisconsin	454,300.00	142,300.00	312,000.00	86.4	526,176.96	142,300.00	312,000.00	71,876.96
Total	30,593,333.50	18,813,233.76	11,780,099.74	5,216.8	67,865,793.99	18,670,803.86	11,267,688.76	37,927,301.37

TABLE 25.—*Status on June 30, 1938, of loan-and-grant Public Works projects transferred by the Public Works Administration to the Bureau of Public Roads for supervision and audit*—Continued

ALLOTMENTS FROM EMERGENCY RELIEF APPROPRIATION ACT OF 1935

State	Funds allotted by Public Works Administration			Mileage, estimated cost, and funds assigned to specific projects approved under Public Works Administration allotments				
	Tentative allotment by Special Board for Public Works	Allotment by contracts executed		Miles	Estimated total cost	Funds assigned		
		Grant	Loan			Grant	Loan	Other
California	$57,821.22	$57,821.22		0.4	$128,841.92	$57,821.22		$71,020.70
Colorado	3,000,000.00	3,000,000.00		266.6	7,576,275.02	2,994,301.46		1,581,973.56
Florida	71,514.42	71,514.42		.6	158,920.94	71,514.42		87,403.52
Illinois	586,673.50	586,673.50		114.1	1,373,691.06	586,673.50		787,017.56
Iowa	393,632.17	393,632.17		862.1	889,873.60	387,663.76		502,209.81
Kansas	14,463.00	14,463.00		.6	33,364.45	14,463.00		18,901.45
Maryland	1,000,000.00	1,000,000.00		25.4	1,852,397.07	833,623.67		1,018,873.40
Michigan	119,435.00	119,435.00		16.5	290,092.66	119,435.00		170,657.66
Minnesota	152,389.18	152,389.18		69.2	345,350.84	152,389.18		192,961.66
Mississippi	15,325,682.77	15,325,682.77		1,396.3	34,028,646.17	15,202,441.87		18,826,204.30
Missouri	396,699.54	396,699.54		364.5	881,689.86	396,699.54		484,990.32
Nebraska	6,611.95	6,611.95		18.0	14,914.82	6,611.95		8,302.87
New Jersey	29,862.95	29,862.95		3.1	66,362.13	29,862.95		36,499.18
New York	212,872.41	212,872.41		28.7	518,538.28	212,872.41		305,665.87
Ohio	744,519.37	356,122.93	$388,396.44	229.5	805,398.87	356,122.93	$388,396.44	60,879.50
Tennessee	349,969.34	349,969.34		1.7	625,682.15	281,556.97		344,125.18
South Carolina	712,728.27	479,728.27	233,000.00	249.7	1,056,670.58	467,963.57	233,000.00	355,707.01
Texas	2,930,192.72	2,440,192.72	490,000.00	381.9	5,857,570.83	2,440,192.72	490,000.00	2,927,378.11
Utah	45,900.00	45,900.00		29.1	116,352.95	45,900.00		70,452.95
Washington	730,883.06	730,883.06		202.9	1,904,722.67	728,272.99		1,176,449.63
Total	26,881,850.87	25,770,454.43	1,111,396.44	4,260.9	58,525,456.87	25,386,383.11	1,111,396.44	32,027,677.32

NATIONAL FOREST ROAD CONSTRUCTION

The area of the national forests is extensive, covering parts of 42 States. The greater part of this area is in the Western States, where in some instances the national-forest area is a relatively large percentage of the area of the State.

Transcontinental United States routes, Federal-aid highways, and State highways are coincident with a considerable part of the forest-highway system. Of the forest-highway system, of approximately 22,000 miles, over 39 percent is on the Federal-aid system, and an additional 39 percent is on the respective State systems, and roads of lesser importance make up only about 22 percent. It is therefore necessary that the system be constructed according to standards comparable with those used on the Federal-aid and State systems.

Construction of the forest-highway system has been under way for about 20 years, starting at a time when high standards had not come into use and when funds were relatively small. Routes could be opened up through the forests only by constructing roads having narrow widths, sharp curves, and steep grades when judged according to present standards. Surfacing was largely with local materials, such as clay-bound gravel, crushed stone, or gravel; all of which resulted in considerable mileage of low-standard roads which, while adequate for the traffic when constructed, has been gradually improved to meet constantly increasing traffic demands.

Crushed stone has been generally used for surfacing in recent years and a variety of types of bituminous construction have been developed to preserve surfaces from wear and loosening under high-speed traffic. Reconstruction has been necessary at times, in the interest of safety, to straighten roads of sharp curvature and reduce excessive grades.

With the general increase in highway traffic and expansion of highway systems it has been necessary continually to add to the original system. Approximately 1,700 miles was added during the past year. This mileage is largely in the Eastern States where new forest areas have been acquired.

The Bureau has constructed a substantial mileage on the forest-highway system, which carries interstate and transcontinental traffic, a large portion of which is recreational in character. These roads furnish millions of tourists an opportunity for recreation and enjoyment in forest areas, many of which are at a high elevation and have unusual scenic beauty. Recreation in forest areas is increasing yearly and is recognized in the design and location of forest roads by providing vistas, parking areas, and convenient accommodations for observation, camping, fishing, and hunting.

Landscaping and erosion control are of particular importance by reason of character of traffic and because of the wealth of natural beauty in the forests to be preserved. Effort is made to remove all scars of construction operations by sodding, seeding, and placing checks on washes, to control drainage and to prevent erosion. Where traffic is predominantly recreational many vistas and parking areas are provided. Emphasis is placed on the exterior appearance of the bridges, attention being given to pleasing proportions and to coordination between substructure and superstructure. Bridge railings are designed to give unobstructed vision of the surrounding country.

The two principal classes of forest roads are designated forest highways and forest-development roads, respectively. The latter class, as the name implies, serve primarily the development of the forests; the former are roads of a higher order of traffic importance, generally connecting with sections of the Federal-aid or State-highway systems outside the forests, or important community-service roads. This class requires improvement to higher standard than that required on forest-development roads.

In the main, the work supervised by the Bureau is limited to the construction and maintenance of forest highways; forest-development road work is generally administered by the Forest Service. While this definition of the work of the two classes, defining the responsibility for construction, is approximately correct, the exact line of separation is drawn between what are termed major and minor projects. Work in connection with major projects is administered by the Bureau. Major projects include all projects on the forest-highway system except those that do not require the technical services of a highway-engineering organization or those having an estimated average cost of less than $2,000 per mile. Forest-development road projects of estimated average cost greater than $5,000 per mile, and those requiring the technical services of a highway-engineering organization, are also classed as major projects.

Funds for the improvement of forest roads and trails have been authorized at a rate of $10,000,000 for each of the fiscal years 1935–37 and $14,000,000 was authorized for 1938. At the beginning of the fiscal year the active program involved $9,694,602 and $18,420,772 additional was available for new work, being in part composed of funds remaining from authorizations for previous years.

The active program involving $9,694,602 included work amounting to $6,208,594 under construction, surveys costing $1,626,750, maintenance work costing $1,447,408, and $411,850 involved in miscellaneous items. Of the $18,420,772 available for new work, $6,419,902 was assigned to projects not then under contract, and $12,000,870 was available for projects to be selected. This $12,000,870 was comprised of $9,333,333 of funds authorized for the new fiscal year and a remainder of $2,667,537 from previous years. During the year $8,475,643 was assigned to major projects and $162,767 was assigned to minor projects, leaving a balance of old funds available for programming of $3,362,460.

Major work costing $8,166,648 was put under contract and completed work amounted to $7,636,503.

At the close of the year, the active program of forest road work under the supervision of the Bureau amounted to $10,224,747, of which $6,825,767 was involved in work under construction, $1,647,091 in surveys, $1,426,578 in maintenance operations, and $325,311 in miscellaneous work. The amount available for new work was $10,091,357, of which $6,728,897 had been assigned to projects not then under contract. These amounts include the $14,000,000 authorized for the fiscal year 1939.

In accordance with requirements of the governing rules and regulations, the system of forest highways has been designated by concurrent action of the several State highway departments, the Forest Service, and this Bureau, and approved by the Secretary. Also, as required by the rules and regulations, the highways constituting this system have been classified as follows:

Class 1. Forest roads forming sections of the Federal-aid highway system, either wholly within or, when so designated by the Chief of the Forest Service and the Chief of the Bureau of Public Roads, partly without and adjacent to the national forests.

Class 2. Forest roads, not of class 1, which are parts of approved State highway systems, when so designated by the Chief of the Forest Service and the Chief of the Bureau of Public Roads.

Class 3. All other forest roads of primary importance to counties or communities.

The roads which, according to these definitions, have been classified as forest highways have an aggregate length, as of June 30, 1938, of 21,969.8 miles, classified as shown in table 26.

TABLE 26.—*Classification of the mileage of the forest-highway system at end of fiscal year 1938*

Region and State	Class 1	Class 2	Class 3	Total	Region and State	Class 1	Class 2	Class 3	Total
Western:	*Miles*	*Miles*	*Miles*	*Miles*	Eastern—Con.	*Miles*	*Miles*	*Miles*	*Miles*
Alaska	-------	-------	352.8	352.8	Louisiana	66.1	369.4	21.9	457.4
Arizona	345.8	268.6	445.0	1,059.4	Maine	-------	-------	11.0	11.0
California	635.6	1,291.0	501.8	2,428.4	Michigan	466.7	283.8	274.4	1,024.9
Colorado	533.0	1,163.0	94.0	1,790.0	Minnesota	179.4	217.7	207.4	604.5
Idaho	721.3	165.3	191.5	1,078.1	Mississippi	201.0	264.0	71.0	539.0
Montana	666.0	304.6	231.0	1,201.6	Missouri	426.2	160.1	247.3	833.6
Nevada	104.7	282.2	31.0	417.9	Nebraska	10.4	-------	18.4	28.8
New Mexico	162.0	522.0	-------	684.0	New Hampshire	40.9	92.1	41.7	174.7
Oregon	718.5	352.5	304.4	1,375.4	North Carolina	483.6	279.0	20.5	783.1
South Dakota	227.0	-------	86.0	313.0	Oklahoma	31.5	17.0	13.5	62.0
Utah	191.4	471.4	67.2	730.0	Pennsylvania	134.0	250.9	39.0	423.9
Washington	401.8	123.1	246.8	771.7	Puerto Rico	-------	-------	21.0	21.0
Wyoming	387.3	37.0	217.7	642.0	South Carolina	196.0	128.6	23.4	348.0
					Tennessee	131.6	133.6	80.2	345.4
Total	5,094.4	4,980.7	2,769.2	12,844.3	Texas	123.5	168.4	111.2	403.1
					Vermont	32.7	43.2	58.6	134.5
Eastern:					Virginia	79.0	117.9	220.0	416.9
Alabama	4.0	-------	31.0	35.0	West Virginia	131.0	168.2	66.6	365.8
Arkansas	274.6	310.3	44.6	629.5	Wisconsin	85.7	177.0	206.9	469.6
Florida	27.3	218.9	-------	246.2					
Georgia	110.3	36.5	58.5	205.3	Total	3,564.0	3,596.2	1,965.3	9,125.5
Illinois	192.7	27.5	48.7	268.9					
Kentucky	132.8	132.1	28.5	293.4	Grand total	8,658.4	8,576.9	4,734.5	21,969.8

The work done in further improving roads previously constructed considerably exceeded the building of entirely new roads. The further improvement of roads, called stage construction, totaled 374 miles. New work on the forest-highway system totaled 129.4 miles, bringing the total mileage improved to date with Federal funds to 6,694.7. Of the new mileage, 95.9 miles was in the Western States and Alaska, and the remaining 33.5 miles was in forests of the Eastern States. Of the total mileage improved, 460.1 miles is in the west and 43.3 miles is in the east. The mileage of forest highways completed by the Bureau, both stage and new, is shown in table 27.

TABLE 27.—*Mileage of completed forest-highway projects by States, fiscal year 1938*[1]

Region and State	Initial improvement and stage construction	Initial improvement	Total to June 30, 1938	Region and State	Initial improvement and stage construction	Initial improvement	Total to June 30, 1938
Western:	*Miles*	*Miles*	*Miles*	Eastern—Continued.	*Miles*	*Miles*	*Miles*
Alaska	22.0	7.7	238.2	Georgia			21.0
Arizona	24.0	5.3	575.7	Illinois			4.7
California	44.1	18.7	781.4	Kentucky	.1	.1	.1
Colorado	40.9	4.3	536.5	Louisiana	.5	.5	.5
Idaho	64.8	4.2	692.0	Michigan	6.2	6.2	56.7
Montana	42.3	16.7	609.3	Minnesota	21.6	18.3	131.8
Nevada	18.7	2.6	176.4	Missouri			8.1
New Mexico	46.0	8.8	313.6	Nebraska	6.5		8.7
Oregon	100.2	14.9	1,021.8	New Hampshire	2.8	2.8	28.0
South Dakota	7.1		61.2	North Carolina			50.9
Utah	19.5	3.1	355.5	Oklahoma	.9	.9	16.1
Washington	15.4	7.5	333.1	Pennsylvania	1.5	1.5	10.6
Wyoming	15.1	2.1	360.3	South Carolina	.4	.4	16.0
				Tennessee			47.4
Total	460.1	95.9	6,055.0	Virginia			22.9
				West Virginia			8.7
Eastern:				Wisconsin			15.7
Alabama			5.1				
Arkansas	2.7	2.7	125.0	Total	43.3	33.5	639.7
Florida	.1	.1	61.7				
				Grand total	503.4	129.4	6,694.7

[1] Changes in the mileage of completed road, resulting from abandonments, relocations, and correction resulting from recent surveys are reflected in this table.

Tables 28 and 29, respectively, show the mileage of highways under construction and completed by the Bureau, segregated by types of construction and by States.

TABLE 28.—*Mileage of forest highways under construction as of June 30, 1938*

Region and State	Graded and drained	Water-bound macadam	Bituminous surface treatment	Low-cost bituminous mix	Bituminous macadam	Portland-cement concrete pavement	Bridges	High-way-railroad grade separations	Total
Western:	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Alaska	0.8	18.0					0.2		19.0
Arizona	24.3		13.2				.1		37.6
California	50.8	8.0	16.2	4.3			.2		79.5
Colorado		33.0					(1)		33.0
Idaho	26.9	15.6					.1		42.6
Montana	10.2		5.5	.5			.1	0.1	16.4
Nevada	7.6								7.6
New Mexico		.8		12.9					13.7
Oregon	11.3		15.5			0.2	(1)		27.0
South Dakota				3.9					3.9
Utah	2.2	7.2					(1)		9.4
Washington	11.1								11.1
Wyoming		2.3		8.1					10.4
Total	145.2	84.9	50.4	29.7		.2	.7	.1	311.2

[1] Mileage less than 0.1 mile.

TABLE 28.—*Mileage of forest highways under construction as of June 30, 1938*—Continued

Region and State	Graded and drained	Water-bound macadam	Bituminous surface treatment	Low-cost bituminous mix	Bituminous macadam	Portland-cement concrete pavement	Bridges	Highway-railroad grade separations	Total
Eastern:	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Arkansas		6.6					.1		6.7
Florida							.2		.2
Georgia		7.9					(1)		7.9
Minnesota	8.3								8.3
Mississippi	(1)						.1		.1
New Hampshire			1.1						1.1
North Carolina		12.4					(1)		12.4
Texas	5.0						.1		5.1
Virginia			6.5				(1)		6.5
West Virginia	1.6								1.6
Wisconsin	6.8								6.8
Total	21.7	26.9	7.6				.5		56.7
Grand total	166.9	111.8	58.0	29.7		.2	1.2	.1	367.9

[1] Mileage less than 0.1 mile.

TABLE 29.—*Completed forest highways by States and by types to June 30, 1938*

Region and State	Graded and drained	Sand-clay	Traffic-bound surfaces of miscellaneous material	Bituminous surface treatment	Low-cost bituminous mix	Bituminous macadam	Portland-cement concrete	Bridges	Total
Western:	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Alaska			235.8					2.4	238.2
Arizona	213.2		298.4	24.6	15.4	23.4		.7	575.7
California	240.8		170.4	262.3	105.4			2.5	781.4
Colorado	153.6		265.3	2.0	115.3			.3	536.5
Idaho	291.5		260.0		138.2		0.1	2.2	692.0
Montana	216.1		228.5	37.5	125.2			2.0	609.3
Nevada	46.9		51.4	16.1	62.0			(1)	176.4
New Mexico	47.9		197.0	15.3	53.2			.2	313.6
Oregon	160.8		612.7	157.3	72.3	14.6	.3	3.8	1,021.8
South Dakota			46.4		14.8				61.2
Utah	133.5		162.3		59.1			.6	355.5
Washington	86.5		239.8	4.6				2.2	333.1
Wyoming	38.6		255.4		66.0			.3	360.3
Total	1,629.4		3,023.4	519.7	826.9	38.0	.4	17.2	6,055.0
Eastern:									
Alabama			5.1						5.1
Arkansas	95.9		28.5					.6	125.0
Florida		4.3		26.6	29.8			1.0	61.7
Georgia	11.0		9.9					.1	21.0
Illinois			4.7						4.7
Kentucky								.1	.1
Louisiana			.4					.1	.5
Michigan			56.7					(1)	56.7
Minnesota	55.5		60.1		16.0			.2	131.8
Missouri			8.1					(1)	8.1
Nebraska	2.2	6.5							8.7
New Hampshire			14.8	13.1				.1	28.0
North Carolina	14.2		6.6	30.1				(1)	50.9
Oklahoma	.2		15.9					(1)	16.1
Pennsylvania			1.8			8.8			10.6
South Carolina				16.0				(1)	16.0
Tennessee			47.4						47.4
Virginia	3.5		2.3	10.6		6.5		(1)	22.9
West Virginia	6.0		2.6					.1	8.7
Wisconsin	1.5		14.2						15.7
Total	190.0	10.8	279.1	96.4	45.8	15.3		2.3	639.7
Grand total	1,819.4	10.8	3,302.5	616.1	872.7	53.3	.4	19.5	6,694.7

[1] Less than 0.1 mile.

Important through routes are being developed progressively by improvements made from year to year. Examples of recent improvements are as follows.

Montana:
- Libby-State line on U. S. 2.
- Pleasant Valley highway on U. S. 2.
- Yellowstone Trail, U. S. 10.

Oregon:
- Willamette highway on U. S. 30.
- Santiam highway on U. S. 30.
- Columbia River highway on U. S. 30.
- Fremont highway on U. S. 395.
- Pendleton-John Day highway on U. S. 395.
- John Day-Burns highway on U. S. 395.
- Cascades Lakes highway.

Washington:
- Stevens Pass highway.
- Randle-Yakima highway.

Arizona:
- Fredonia-Houserock Valley highway on U. S. 89.

California:
- Placerville-Lake Tahoe highway on U. S. 50.

Colorado:
- Loveland-Fremont Pass highway on U. S. 6.
- Rabbit Ears Pass highway on U. S. 40.
- Berthoud Pass highway on U. S. 40.

New Mexico:
- Navajo Canyon highway on U. S. 285.
- Cedro Canyon highway.
- Carrizozo-Roswell highway on U. S. 380.

South Dakota:
- Deadwood-Custer-Hot Springs highway on U. S. 85-A.

Wyoming:
- Wind River highway on U. S. 287.
- Hoback Canyon highway on U. S. 187.
- Buffalo-Tensleep highway on U. S. 16.

Idaho:
- Clark Fork highway.
- Payette highway.
- Sawtooth Park highway on U. S. 93.

ROAD CONSTRUCTION IN NATIONAL PARKS AND MONUMENTS

National parks and monuments have been established in 33 States, the largest and best known being in the Western States. These areas of exceptional natural phenomena and places of particular historic significance and scenic beauty are recreation grounds for the entire Nation. Nature and events in past history have provided places that everyone desires to see and highways are the primary requirement in making them accessible to thousands of people who must plan vacation trips of moderate cost.

The construction of roads in and approaching national parks and monuments is a responsibility of the Bureau under an inter-Bureau agreement with the National Park Service.

In addition over 900 miles of parkways have been established by Congress in the East. These parkways connect points of special interest to tourists and are located on a right-of-way sufficiently broad to give complete control of roadside development. One follows closely the crest of the Blue Ridge between the Shenandoah National Park in Virginia and the Great Smoky Mountains National Park in Tennessee and North Carolina. Another follows the old historic trail between Natchez, Miss., and Nashville, Tenn.

TABLE 30.—*Highways completed in or leading to national parks and monuments, fiscal year 1938*

Park, monument, or parkway	Initial improvement and stage construction	Initial improvement completed	Total to June 30, 1938	Park, monument, or parkway	Initial improvement and stage construction	Initial improvement completed	Total to June 30, 1938
	Miles	*Miles*	*Miles*		*Miles*	*Miles*	*Miles*
Acadia	3.2	3.2	15.3	Hawaii			35.6
Blue Ridge	74.0	74.0	124.5	Hot Springs			3.5
Bryce Canyon			21.7	Kill Devil Hill			1.6
Carlsbad Caverns			8.4	Lassen Volcanic	4.7		35.1
Chalmette			.5	Meriwether Lewis			[1] 1.8
Chickamauga-Chattanooga			17.6	Mesa Verde	31.9	11.4	32.0
Colonial			[1] 12.3	Morristown			2.6
Crater Lake			57.9	Mount Rainier	29.7	1.2	[1] 81.7
Devil's Tower			.3	National Capital Parks	.4	.4	5.7
Fort Donelson			[1] 2.7	Petersburg			7.3
Fort Matanzas	.6	.6	.6	Petrified Forest	4.8	4.8	31.1
Fort Pulaski	.3	.3	.3	Rocky Mountain	46.9		51.4
Fredericksburg-Spotsylvania	.3	.3	23.5	Scotts Bluff	1.6		1.6
General Grant	6.3	3.9	10.3	Sequoia	3.8		46.1
George Washington Birthplace			2.6	Shenandoah	18.2	18.2	89.8
Gettysburg	4.2	4.2	7.3	Shiloh			10.3
Glacier	19.9	16.4	74.4	Vicksburg	.5	.5	5.3
Grand Canyon	7.7		162.1	Wind Cave			15.9
Great Smoky Mountains	7.7	4.1	27.0	Yellowstone	43.3	1.9	289.7
Guilford Courthouse	2.6	2.6	2.6	Yosemite	17.1	5.5	104.0
				Zion			18.7
				Total	329.7	153.5	1,442.7

[1] Revised figure resulting from final survey.

Highway construction in national parks and monuments is carried on under the same general plan and according to the same standards as have been described for work in the national forests with the exception that the landscaping branch of the Park Service participates actively in locating and planning highways to fit them into and preserve the natural beauty of the parks.

At the close of the year, 1,443 miles of road had been constructed in the national parks and monuments, an increase of 153 miles during the past year. This mileage includes both approach roads and parkways. In addition, 176 miles of road previously constructed was further improved, in most instances by placing a better surface. The completed mileage is shown by parks and monuments in table 30, and by types in table 31.

TABLE 31.—*Highways completed in or leading to national parks and monuments at end of fiscal year 1938, by types*

Park, monument, or parkway	Graded and drained	Gravel	Bituminous treatment	Bituminous mixture	Bituminous macadam	Bituminous concrete	Portland-cement concrete	Bridges	Total
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Acadia		0.2	7.1		8.0				15.3
Blue Ridge Parkway	2.5	122.0							124.5
Bryce Canyon				21.7					21.7
Carlsbad Caverns				8.4					8.4
Chalmette							0.5		.5
Chickamauga-Chattanooga				10.4			7.2		17.6
Colonial	2.7		.6				8.8	0.2	12.3
Crater Lake	4.1	18.6	1.9	26.4	6.8			.1	57.9
Devil's Tower								.3	.3
Fort Donelson				2.7					2.7
Fort Matanzas				.5				.1	.6
Fort Pulaski	.1							.2	.3
Fredericksburg-Spotsylvania			18.0	5.3		0.2			23.5
General Grant	7.9		2.4						10.3
George Washington Birthplace			2.6						2.6
Gettysburg				.8		6.5			7.3
Glacier	16.4	23.7	34.1					.2	74.4
Grand Canyon		.7		146.7	14.6			.1	162.1
Great Smoky Mountains		3.6	19.4	4.0					27.0
Guilford Court House						2.6			2.6
Hawaii			10.6	9.0	16.0				35.6
Hot Springs			3.5						3.5
Kill Devil Hill				1.6					1.6
Lassen Volcanic				35.1					35.1
Meriwether Lewis				1.8					1.8
Mesa Verde				32.0					32.0
Morristown		2.6							2.6
Mount Rainier	20.5	24.7		20.7	15.5			.3	81.7
National Capital parks	1.1		.4			4.0		.2	5.7
Petersburg	1.3		6.0						7.3
Petrified Forest			4.9	26.0				.2	31.1
Rocky Mountain			8.0	43.4					51.4
Scotts Bluff							1.6		1.6
Sequoia	6.2		14.3	25.5				.1	46.1
Shenandoah	6.4	18.1	12.5	52.8					89.8
Shiloh				3.7			6.6		10.3
Vicksburg	.2	.3					4.7	.1	5.3
Wind Cave				15.9					15.9
Yellowstone		36.6	98.2	154.2				.7	289.7
Yosemite	19.4		26.3	27.7	14.1	10.0	6.2	.3	104.0
Zion				17.6			1.0	.1	18.7
Total	88.8	251.1	270.8	693.9	75.0	23.3	36.6	3.2	1,442.7

In Glacier National Park a surfaced road has been constructed through the park and across the continental divide at Logan Pass at an elevation of 6,654 feet. In Mount Rainier National Park both the Westside and Stevens Canyon routes, which are of considerable length, are being improved by including sections in each year's program. Work is now being concentrated in Stevens Canyon. In Crater Lake National Park the last section of the loop around the lake between Government Camp and Kerr Notch is approaching completion. In Yosemite the Big Oak Flat road route, involving difficult location and construction, is approaching completion. The tunnels on this route will soon be lined and sections between these tunnels graded and surfaced. There still remains a long uncompleted gap in the Tioga Road in Yosemite. This is a superb mountain highway through some of the most rugged of the high Sierras, crossing the Sierras at Tioga Pass at an elevation of nearly 10,000 feet. Additional work on this road is planned. Roads

within Yellowstone National Park and the approach road from the east are being improved.

In the Eastern States attention is being focused on the construction of parkways. The Blue Ridge Parkway following closely the crest of the Blue Ridge Mountains for approximately 480 miles passes through Virginia and North Carolina into Tennessee and connects the Shenandoah and Great Smoky Mountains National Parks. Approximately 124 miles has been completed and 157 miles is under construction, a portion of which is surfacing of roads previously graded.

The Natchez Trace Parkway passes through historic sections of Mississippi, Alabama, and Tennessee for approximately 455 miles. No mileage is as yet completed but 36 miles is under construction.

Mileage of highways under construction is listed by location and types in table 32.

TABLE 32.—*Highways under construction in or leading to national parks and monuments at end of fiscal year 1938, by types*

Park, monument, or parkway	Graded and drained	Gravel	Bituminous treatment	Bituminous mixture	Bituminous macadam	Bituminous concrete	Portland-cement concrete	Bridges	Total
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Acadia			3.1					0.1	3.2
Blue Ridge Parkway		51.8	56.6	49.1				.3	157.8
Boulder Dam Recreational Area				9.4					9.4
Colonial			.2				1.7		1.9
Crater Lake	4.9		24.6	12.4					41.9
Glacier			16.4						16.4
Grand Canyon			30.4	14.6					45.0
Great Smoky Mountains		3.1							3.1
Mount Rainier	4.6		13.7					(1)	18.3
Natchez Trace	36.3								36.3
National Capital parks						0.6		.1	.7
Petrified Forest			4.8						4.8
Rocky Mountain				8.1					8.1
Sequoia				12.5					12.5
Shenandoah		13.8				9.5			23.3
Vicksburg			.4				2.2		2.6
Yellowstone	10.0	.9		2.1					13.0
Yosemite	2.7	12.6							15.3
Zion-Bryce Canyon	1.9								1.9
Total	60.4	82.2	150.2	108.2		10.1	3.9	.5	415.5

[1] Less than 0.1 mile.

The mileage of approach roads completed and under construction and approved for construction is reported in table 33.

TABLE 33.—*Location and length of approach roads to national parks and monuments, June 30, 1938*

Road	Park	Designated	Under construction	Completed
		Miles	*Miles*	*Miles*
Fresno-General Grant	General Grant	3.9		3.9
Cameron-Desert View	Grand Canyon	28.1		28.1
South Approach	do	52.3		52.3
Jacobs Lake-North Rim	do	31.2	31.2	[1] 31.2
Mineral-Lassen Volcanic	Lassen Volcanic	8.8		4.7 [2] 4.1
Sequoia-General Grant	Sequoia-General Grant	13.5		13.5
Custer-Wind Cave	Wind Cave	8.6		8.6
Southwest Approach	Yellowstone	13.9		13.9
Moran-Yellowstone	do	24.0		5.8
Red Lodge-Cooke City	do	59.6		59.7
East Approach	do	23.0		13.7
Zion-Bryce Canyon	Zion-Bryce Canyon	35.0	1.9	
Total		301.9	33.1	204.2

[1] Graded as a forest-road project. Figure not included in total.
[2] Completed as a forest-road project. Figure not included in total.

INTER-AMERICAN HIGHWAY

Work on the Inter-American highway continued throughout the year, and substantial progress was made in the construction of bridges and in assisting the various countries in locating and planning links in the highway. This highway, which is to extend from Laredo, Tex., to Panama City, Panama, follows a route recommended by the Bureau in 1934, as the result of a reconnaissance survey made at the request of the Department of State and the countries concerned. Recent work has been done under an authorization of $1,000,000 made in 1934 for cooperation in the survey and construction of the highway.

Under a cooperative arrangement assistance has been given to Panama, Costa Rica, Nicaragua, Honduras, and Guatemala in the erection of bridges. The United States agreed to furnish all needed engineering supervision and products of American heavy industry such as steel, cement, and equipment necessary in the work, and to transport such articles to the construction sites. The other countries agreed to furnish local materials needed for the bridges; to furnish all labor needed for construction; to build all substructures of bridges and approaches wherever necessary; and to construct the necessary sections of road to make all bridges serviceable on or immediately following construction.

Cooperation has also included the making of additional reconnaissance surveys in Guatemala, Nicaragua, and Costa Rica, and location surveys in Panama, Nicaragua, Guatemala, and Costa Rica; additional bridge investigations and surveys in all countries mentioned except Guatemala; and the designing of a group of standard bridge plans considered most useful for the immediate future programs of the several countries. A complete list of the 39 projects included under the entire program follows:

	Total length
Bridges built under contract (9):	
Rio Chiriqui, Panama	787 feet.
Rio Choluteca, Honduras	1,088 feet.
Rio Tamazulapa, Guatemala	486 feet.
Rio Las Maderas, Nicaragua	96-foot span.
Rio Platanar, Panama	120-foot span.
Rio Grande, Nicaragua	120-foot span.
Rio Esteli, Nicaragua	96-foot span.
Rio Amatal, Guatemala	96-foot span.
Rio Tahuapa, Guatemala	30-foot span.
Bridges erected by force account (6):	
Rio Chirigagua, Panama	96-foot span.
Rio San Cristobal, Panama	100-foot span.
Rio Tincal, Guatemala	20-foot span.
Rio Zonjon, Guatemala	8-foot span.
Rio Mongoy (1) Guatemala	12-foot span.
Rio Mongoy (2) Guatemala	31-foot 4-inch span.
Bridges surveyed and designed (5):	
Rio Tenorio, Costa Rica.	
Rio Ochomogo, Nicaragua.	
Rio Viejo, Nicaragua.	
Rio Istaca, Honduras.	
Rio La Leona, Honduras.	
Bridges investigated (4):	
Rio Mula, Panama.	
Rio Chico, Panama.	
Rio Caimito, Panama.	
Rio Agua Caliente, Honduras.	
Road surveys completed (4):	
David-Concepcion-Frontera, Panama	65 miles.
Tipitapa-Rio Las Maderas, Nicaragua	20.5 miles.
Asuncion Mita-Frontera, Guatemala	12.5 miles.
Cartago-San Marcos, Costa Rica	25 miles.
Road reconnaissance surveys completed (4):	
La Conora Mountain, Guatemala	8 miles.
Progreso Mountain, Guatemala	8 miles.
Las Maderas-Sebaco, Nicaragua	30 miles.
Naranjo-Las Canas, Costa Rica	116 miles.
Roads under construction on which assistance was given in planning (3):	
Tipitapa-Rio Las Maderas, Nicaragua	18 miles.
Asuncion Mita-Frontera, Guatemala	12.5 miles.
Cartago-San Marcos, Costa Rica	25 miles.
Standard plans designed (4):	
Three pony truss briges.	
Three through truss bridges.	
Five cantilever I-beam bridges.	
One concrete box culvert, 10 by 10 feet.	

The Chiriqui, Choluteca, and Tamazulapa Bridges which were included in a single contract were major structures of suspension design.

All of the larger bridges are now completed except those at the Rio Chirigagua and Rio San Cristobal in Panama, which are now being erected.

Shipments from the United States to the several countries for this work have amounted to a total of 6,357 tons. The more important items were cement, fabricated bridge steel, reinforcing steel, and road and bridge equipment. Miscellaneous items included culvert pipe, corrugated sheet metal, steel piling, and a small quantity of quarry supplies.

The delivery of materials and equipment from shipside to bridge site was in every case a serious problem. Deliveries of materials for the Choluteca and Tamazulapa Bridges are typical of the difficulties encountered. All shipments to Choluteca were landed at the port of Amapala, Honduras. This port is on Tigre Island, 16 miles from the mainland port. Ships anchored in the roadstead, and as there are no wharf facilities freight was discharged into open lighters. The lighters were then towed or sailed 16 miles to the mainland port where freight was discharged, loaded into carts or trucks, and hauled approximately 25 miles to the bridge site.

Deliveries for the Tamazulapa Bridge in Guatemala were made by ocean steamer at Puerto Barrios on the Caribbean side, shipped by rail to Santa Lucia, El Salvador, there unloaded, and hauled by truck 52 miles to the bridge site.

In each country where cooperative work has been conducted, a Bureau engineer has been placed in charge as resident engineer. All other positions have been filled with local engineers, most of whom have been trained in the United States. It has been the policy to aid each country in developing its own highway engineers capable of carrying on future highway programs according to the most modern standards.

Approximately 90 percent of the $1,000,000 made available in 1934 has been expended. Slightly more than 70 percent has been expended for materials produced in this country and about 20 percent has been paid for services and personnel.

Although work has been done at many points along 1,000 miles of the route and has often been accompanied by unusual difficulties and the necessity of resorting to primitive means, the cost of engineering services and overhead expenses has been kept down to about 12 percent. Expenditures by the United States for construction have been slightly exceeded by corresponding expenditures by the cooperating countries. On work for which the United States provided $680,000 the cooperators provided $710,000.

Efforts by the United States to foster the development of the Inter-American highway have been highly successful. In every country interest in road construction has been aroused and efforts are being concentrated on the route from Panama to the United States. There has been no direct cooperation with Mexico but relations with Mexican highway officials have been amicable at all times. The section of the highway from Laredo to Mexico City was completed by the Mexican Government more than a year ago and a program is now under way to complete the road from Mexico City to Guatemala, although the original plan of the Mexican authorities was to direct the next effort to a route on the Pacific coast from Arizona to Mexico City.

In Guatemala the highway organization has been notably strengthened and reconstruction and betterments now in progress will make the road across Guatemala entirely serviceable at all seasons of the year by 1940.

Very friendly relations have been maintained with the highway authorities of El Salvador but there has been no active participation in highway work there. Encouraged by the work in neighboring countries the Government of El Salvador is carrying on a program under which the entire route across this Republic will be three-quarters completed in 1940, and probably entirely completed in 1941.

In Honduras only about 90 miles of highway are included in the inter-American route, and one-third of this is now passable at all seasons. The Government of Honduras has requested further engineering assistance, and if possible, further cooperation in improving this section.

In Nicaragua the Government has tried twice to enter into a satisfactory contract with private contractors for a considerable mileage of highway construction, but difficulties in independently financing a large program have so far prevented success in this direction. The Government is able, however, to expend from 40,000 to 60,000 cordobas ($8,000 to $12,000) a month and has requested further surveys and engineering assistance in extending the improved road in that country. At the last session of the Congress of Costa Rica, 1,050,000 colones ($187,200) was appropriated to provide for cooperative construction under the direction of Bureau engineers, and also for about 12½ miles of additional road, all on the inter-American route.

The Government of Panama has committed itself to complete approximately 65 miles of road north of David, where assistance has been given in the construction of three bridges. This work will complete the road from Panama City to the Costa Rica line. Owing to the present financial condition of Panama, construction is proceeding slowly but steadily.

The present general status of the inter-American highway from Laredo, Tex., to Panama City is given in table 34.

TABLE 34.—*Status of improvement of the inter-American highway, Laredo, Tex., to Panama, June 30, 1938* [1]

Section	Paved road	Gravel road	Graded earth road	Ungraded road or trail
	Miles	*Miles*	*Miles*	*Miles*
Nuevo Laredo-Mexico City	765			
Mexico City-Oaxaca	40			300
Oaxaca-Guatemala line				635
Mexico line-Quetzaltenango				80
Quetzaltenango-Asuncion Mita		212		
Asuncion Mita-El Salvador line			24	
Guatemala line-Santana		20	4	
Santana-San Vicente	30	49		
San Vicente-Honduras line				88
El Salvador line-San Lorenzo				37
San Lorenzo-Choluteca		23		
Choluteca-Nicaragua line				30
Honduras line-Esteli				50
Esteli-Las Maderas				60
Las Maderas-Managua		35		
Managua-Costa Rica line				100
Nicaragua line-Naranjo				163
Naranjo-Cartago	48			
Cartago-Panama line				145
Costa Rica line-David			15	44
David-Panama City	200	108		
Total	1,083	447	43	1,732

[1] Mileage figures based on proposed new location in Mexico and Nicaragua.

If the programs in Mexico, Guatemala, and El Salvador are carried out as now projected, an all-weather road should be completed as far south as Choluteca, Honduras, by the end of 1941.

TRANSPORTATION, ECONOMIC, AND STATISTICAL INVESTIGATIONS

HIGHWAY-PLANNING SURVEYS

At the beginning of the year, 43 States had undertaken State-wide highway planning surveys in cooperation with the Bureau under authority contained in the Hayden-Cartwright Act of 1934 and subsequent legislation which authorized the Secretary of Agriculture to approve allotments of not to exceed 1½ percent of the amount of Federal highway funds apportioned for any year, for surveys, plans, and engineering and economic investigations of projects for future construction. Since then, three additional States, New Jersey, Mississippi, and Connecticut, have undertaken the work, bringing the total to 46.

Many States which undertook the surveys when they were first proposed by the Bureau have progressed to the point of interpreting the data for a series of reports to their citizens on the status of the highway plant, generally following an outline suggested by the Bureau. The planning surveys are demonstrating their value more convincingly as analysis of the data progresses and the results are used in supplying facts and figures to other branches of the highway departments and to interested agencies. In this way the surveys have served as an essential aid in the general administration and operation of government. Upon request copies of the county base maps prepared in connection with the surveys have been furnished to the National Park Service, the Agricultural Adjustment Administration, the Soil Conservation Service, and other agencies. Copies will also be furnished to the Census Bureau for use in taking the 1940 census. In a number of instances, traffic information has been furnished to the Forest Service for use in planning roads under their jurisdiction.

Field inventories of the rural road system have been completed in 38 States with 2,519,000 miles of road. In eight other States, with an estimated road mileage of 406,583, the mileage inventoried to June 30 was 170,429. Preparation of base maps showing all rural roads and other essential data, is progressing and most States expect to complete the majority of their maps by the middle of the 1939 fiscal year. Alabama, Arizona, Arkansas, Idaho, Illinois, Kansas, Montana, Nebraska, North Dakota, Oregon, and Wyoming have completed base map tracings. Approximately 4,080 base maps will be required for the 3,005 counties of the States now conducting planning surveys. Already 1,625 maps have been forwarded to Washington for examination. Base maps, in general, have been constructed on well established land coordinates in close cooperation with the General Land Office, the Geological Survey, and the Coast and Geodetic Survey. Nineteen States have reported the use of aerial photographs in making or checking county base maps, and Virginia in particular will have the advantage of aerial photographs of its entire area.

The surveys include the collection of data on sharp curves, steep grades, lack of superelevation, and limited sight distance on the primary highways, and a record is made of the location and nature of critical restrictions. These data are assembled under two general classes: (1) Nonmountainous roads having sight distances of less than 1,000 feet, curvature exceeding 6°, and grades exceeding 5 percent; and (2) mountainous roads having sight distances less than 650 feet, curvature exceeding 14°, and grades exceeding 8 percent. These data will reveal critical sections of the highway system requiring early attention and, when correlated with traffic density and accident records, will provide the basis for highway programs in which priority will be given to those improvements most urgently needed.

In cooperation with the Association of American Railroads, pertinent facts relating to rural and urban grade crossings are being obtained which will be combined with a field inventory of the crossings and traffic data to arrive at programs of abandonment, protection, and elimination by separation of grades, giving priority to the most dangerous crossings. Most of the data to be supplied by the railroads have been received and await the completion of the urban-crossing inventory.

Field work on traffic surveys has been completed by the majority of the States. At 3,323 weighing stations, the weights of trucks, commodities carried, as well as other data, were recorded for thousands of trucks, tractor-truck semitrailers, and trucks with full trailers. Information on the tonnage moved over the highways has been obtained from stations where portable weighing devices were used, while more detailed and precise data were obtained at pit-scale stations to determine loading practices. Such data have important bearing on regulation and taxation. Information regarding the weights and dimensions of busses and number of passengers carried was also obtained at these stations. Traffic-flow maps for the primary road system have been prepared by nine States.

Working continually are 353 automatic traffic-recording machines, recording the hourly passage of vehicles. The design of these units was originally conceived by the Bureau and later perfected by commercial organizations. Installed at strategically located points, these machines provide a long-period record of traffic volume. Completeness of the records permits the determination of characteristic traffic patterns and factors with which to expand short-period counts to annual averages and to show minimum, average, and maximum traffic volumes.

Summaries of road-life data, extracted from the records of State highway departments are being prepared in all States making the planning surveys. Life tables are being prepared and the probable average life determined for each surface type as well as construction costs, maintenance costs, and probable salvage value. From a careful interpretation of these data, more dependable estimates may be made of the public investment in highways, cost of ownership, and probable annual cost of present and future improvements.

The financial surveys involve studies of highway income, expenditure, and debt of the State and of all the subdivisions within the State. They will indicate where and how the money is now being spent and for what purpose. Motor-vehicle allocation studies, based on an analysis of questionnaires received from motor-vehicle owners, will show the location and occupation of persons paying motor taxes and the share paid by residents of cities, towns, and rural areas. The road-use surveys will show the benefits derived from roads, and the extent of use by the various classes of residents.

Information regarding land uses, present and potential, which will have a direct bearing on rural road improvements is to be obtained in an extensive survey

contemplated by the Bureau of Agricultural Economics in cooperation with a number of other agencies of the Department, including this Bureau. Plans for the survey include a classification of land according to its usefulness for agricultural purposes. This information will be used in preparing county maps which will show submarginal areas and the various degrees of usefulness of areas suitable for agriculture.

SAFETY RESEARCH

The results of the safety studies made during the previous year in cooperation with the Highway Research Board of the National Research Council were embodied in a detailed report and published in six parts as House Document No. 462, Seventy-fifth Congress, third session. The six parts are entitled:

Part 1. Nonuniformity of State Motor-Vehicle Traffic Laws.
Part 2. Skilled Investigation at the Scene of the Accident Needed to Develop Causes.
Part 3. Inadequacy of State Motor-Vehicle Accident Reporting.
Part 4. Official Inspection of Vehicles.
Part 5. Case Histories of Fatal Highway Accidents.
Part 6. The Accident-Prone Driver.

A summary report on these researches was also prepared and published as a bulletin of the Bureau, Highway Accidents, Their Causes and Recommendations for Their Prevention.

By cooperative agreement with the Highway Research Board, certain research projects in highway safety that could not be completed for inclusion in the report to Congress were continued, particularly an investigation of the validity and utility of driver test clinics in identifying and re-educating the accident-prone driver.

MAINTENANCE-COST STUDIES

Agreements with the State Highway Departments of Connecticut, New Hampshire, and Rhode Island for a study of highway-maintenance costs in relation to traffic volume were renewed for the fourth year. Traffic records for the third consecutive year were obtained for 31 sections of highway in Connecticut, 52 sections in New Hampshire, and 102 sections in Rhode Island. The States were furnished copies of the records with the average 24-hour traffic density on each section. A detailed report on each section was completed. Detailed maintenance costs on each of the sections are being kept by the States and supplied to the Bureau.

The object of this study is to determine the maintenance costs for different types of road surface in relation to the traffic carried. Due to nonperiodic or infrequent costs of maintenance, no determinations can be made until the records have been kept for a period of at least 5 years.

HIGHWAY-CAPACITY AND VEHICLE-PERFORMANCE STUDIES

Traffic-capacity studies in cooperation with the Illinois Highway Planning Survey were continued. Analysis of the field data was made in Washington and in Chicago. Attention was directed to the design of equipment to reduce the cost and labor of collecting data, and for use in broadening the field of study.

Under cooperative agreements with the Quartermaster Corps of the United States Army and the National Bureau of Standards, and with the assistance of a number of truck manufacturers, an exhaustive study of the performance of new trucks on highway grades was begun. Actual performance of a number of trucks will be determined on a series of grades, and laboratory tests will be conducted on the same vehicles to determine their engine efficiency.

Methods were developed and apparatus was designed and assembled for studying in detail the movements of vehicles over long sections of highway. The normal driving practices under various conditions of traffic and of physical alinement, as well as the distances required for passing under various conditions, will be determined with this apparatus.

Methods were developed, equipment was designed and assembled, and preliminary studies were conducted to determine the lateral placement of vehicles on the highway. This apparatus is to be used in conjunction with apparatus being developed that will automatically indicate the speed of vehicles. This equipment is to be used in a variety of localized studies of driving practices and how they are affected by various conditions of traffic volume and speed, width, surface, and alinement of the highway, and type and condition of the shoulders.

NATIONAL CONFERENCE ON STREET AND HIGHWAY SAFETY

The Bureau continued to cooperate with the executive committee of the National Conference on Street and Highway Safety in the promotion of uniform traffic regulation. Copies of the Uniform Vehicle Code and other literature prepared by the Conference were widely distributed. A revised edition of the pamphlet Guides to Traffic Safety, originally prepared by the executive committee of the Conference in 1934, was published by the Bureau. The Conference reprinted a second large edition of the Manual on Uniform Traffic Control Devices for Streets and Highways compiled in 1935 by a joint committee representing the conference and the American Association of State Highway Officials. At the close of the year, plans were being made for meetings of the committee on uniform traffic laws and ordinances of the Conference to revise the Uniform Vehicle Code and the Model Traffic Ordinance. The joint committee on uniform traffic control devices was also making preparations for revision of the Manual on Uniform Traffic Control Devices for Streets and Highways.

AMERICAN ASSOCIATION OF MOTOR VEHICLE ADMINISTRATORS

Active cooperation was continued with the Association in its program of education and research to advance uniformity in State motor-vehicle laws, reciprocity between States, and in measures aimed at greater highway safety. During most of the year a member of the Bureau staff served as executive secretary of the Association. Under a subsequent arrangement, the Bureau is cooperating with the Automotive Safety Foundation and the National Conservation Bureau in establishing in Washington an administrative office for the Association, with an executive director.

ESTIMATING HIGHWAY-TRAFFIC VOLUME

Further research on the problem of estimating the volume of highway traffic for long periods by extending counts of limited duration made according to fixed schedules has been conducted to determine the most efficient procedure. It is desired to obtain estimates that are closely representative of actual traffic with the minimum number and duration of counts. Precision is affected not only by the number and length of the counting periods, but also by the parts of the day, the days of the week, and the months of the year during which the observations are made. Records from different parts of the country have been studied to determine periods of least dispersion and greatest reliability for sampling. A research report was presented at the annual meeting of the Highway Research Board in 1937.

RAILROAD-ABANDONMENT STUDIES

Abstracts were completed of the records from 1920 to May 31, 1937, of proceedings before the Interstate Commerce Commission for certificates of convenience and necessity permitting the abandonment of railroad lines.

The abstracted data were assembled in tabular form for each abandoned section of railroad to show the carrier, mileage of line, average investment per mile, population density, passenger and freight operating statistics for the last 5 years of operation, purposes for which the railroad was constructed, and reasons for the abandonment of operation. The data were summarized by States.

The proceedings of the Interstate Commerce Commission were also reviewed to determine the portions of the railroads abandoned that were later returned to operation.

The continuing purpose of these investigations is to ascertain what additional burden must be assumed by the highways as the abandonment of railroad lines progresses, especially the abandonment of unprofitable branches originally constructed as feeders to the main lines of railroads. It is desired to keep constantly informed as to the changing interrelationship between highway and railway patterns in each State.

By the orderly examination of causes and conditions surrounding former abandonments, it is hoped to arrive at ways of foreseeing future abandonments and the probable eventual relation between rail and highway transport which should so develop as to produce the largest public benefit from each form of transportation.

PHYSICAL RESEARCH

For a number of years the Bureau has been planning permanent laboratories for its research work at a location where there would be space for outdoor experiments. In previous years funds had been authorized for such an undertaking,

land had been acquired on the Mount Vernon Memorial Highway near Washington and plans had been prepared for laboratories and offices to house the Division of Tests.

Early in the fiscal year a contract for construction was awarded, work was begun soon thereafter, and is now nearing completion. It is expected that during the next fiscal year all the activities of the Bureau at the Arlington Experiment Farm of the Department will be transferred to the new research station.

SUBSURFACE EXPLORATION

The application of electrical resistivity and seismic methods in determining the distance from the ground surface to rock has been continued. Both types of apparatus have now been brought to a satisfactory state of development. Instruments of the types developed by the Bureau are now available commercially.

A complete set of seismic equipment has been purchased for use in the Bureau's work in the Western States and engineers are being given field instruction in its use.

During August and September 1938, at the request of the Corps of Engineers of the United States Army, demonstrations were made of the application of the seismic method of subsurface exploration to problems that arose in flood-control work in New York and New England. The tests indicated that information valuable in such work can be obtained with this equipment at relatively low cost.

In May 1938, at the request of the New Hampshire State Highway Department, demonstrations of both methods of exploration were conducted on a variety of highway projects in that State. By invitation the tests were observed by engineers from neighboring States, the Corps of Engineers and other interested agencies. The electrical-resistivity method was found to be unsatisfactory in the soils encountered, but the seismic method proved its value in detecting and locating the position of solid ledge rock. In the salt-water marshes the seismic method could not be used to determine the depth to solid sand layers where the overlying muck was in a fluid state.

An educational film strip, with text describing the principles and application of the two methods of exploration, has been prepared and copies are being distributed to State highway departments and universities.

MOTOR-VEHICLE IMPACT INVESTIGATIONS

The study of the elastic properties of concrete when acted upon by comparable static and impact forces, as mentioned in the last annual report, has been continued. This fundamental research is expected to furnish a connecting link between the considerable volume of data already obtained on (1) the effects of static loads on concrete pavement slabs, and (2) the magnitude and frequency of the impact forces developed on the highway by motor vehicles. This work is an important part of a broad research to rationalize the structural design of pavements.

A report was published describing the apparatus and method of test. It is anticipated that a progress report describing the results of the tests to date may be published during the coming year.

MEASUREMENT OF ROAD-SURFACE ROUGHNESS

Smoothness of road surface is necessary for comfort in travel and is a matter of concern to every highway engineer. There has been no reliable means for measuring degrees of road roughness. The Bureau has attempted to develop suitable apparatus, and definite progress has been made. A special standardizable one-wheel trailer has been built on which is mounted a device for integrating the successive vehicle spring deflections as the vehicle is towed along the road. This apparatus is ready for preliminary trials.

THE STRUCTURAL DESIGN OF CONCRETE PAVEMENTS

Work in this important field of investigation has been continued. Four reports on the recent researches at the Arlington Experiment Farm have already been published and a fifth report is in the course of preparation. The results presented in the fourth report of the series dealing with the design of joints in concrete pavements resulted in the submission to the Bureau for approval of many new designs, among which were a number of the dowel-plate type. In order to determine the merits of the designs, certain additional or supplementary tests were found to be necessary and are being made.

Final arrangements were made with the Indiana State Highway Commission for the construction of specially reinforced pavement sections on one of their current Federal-aid projects. This work will be done during the coming year. The purpose of this research is to determine the extent to which longitudinal steel reinforcement can be used economically to increase the spacing between transverse joints.

A survey of a considerable number of the older concrete pavements in Michigan was made in June 1938 in cooperation with the Michigan State Highway Department. These pavements were designed without provision for load transfer at the joints. The purpose of the survey was to determine the effect on pavement condition of the absence of provision for load transfer. The pavements studied were, in general, about 10 years old and were on the more heavily traveled routes.

EROSION TEST FOR CULVERT PIPE

Study of the erosion test for quality of bituminous coatings on corrugated-metal culvert pipe has been continued. In recent experiments, an abrasive charge of portland-cement mortar cubes has been used. A progress report covering these tests has been prepared.

The work that has been done indicates that the substitution of mortar cubes for the fragments of brick that are now specified improves the test in that more consistent results are obtained on duplicate samples. However, the test method appears to be deficient in certain respects and consideration is now being given to the possibilities of some other method.

THE STRUCTURAL DESIGN OF NONRIGID PAVEMENTS

Study of this important problem has been under way for some time and during the year a report reviewing past researches and summarizing present knowledge was published. Considerable study has been given to the development of needed instruments, particularly the development of devices for measuring pressures as distributed through nonrigid road surfaces.

INVESTIGATION OF SUPPORTING STRENGTH OF FLEXIBLE CULVERT PIPE IN EARTH EMBANKMENTS

The study of experimental installations of flexible culvert pipe buried in earth fills was continued and a progress report was published. This report presents a theoretical analysis of the problem, applicable to the design of flexible pipe culverts, and a comparison of the results of this analysis with the phenomena observed in the experimental installations. This investigation is to be extended to include observations in the field of the performance of a considerable number of culvert structures to determine, over a wide range of conditions, the value of certain constants that are required in theoretical computations of loads and supporting strength. These field observations will begin during construction of the culverts and will continue for some time thereafter. This is a cooperative study by the Bureau and the Engineering Experiment Station of Iowa State College.

INVESTIGATION OF BRIDGE FLOORS

The cooperative investigation of the action under load of concrete floor slabs of bridges, begun at the University of Illinois in 1936, was continued. This involves theoretical mathematical analyses of various types of floors and the verification of these analyses by observation of experimental floor slabs constructed in the laboratory. Two valuable reports on this work were published as bulletins of the University. One describes a distribution procedure for the analysis of slabs continuous over flexible supports and the other gives solutions for a number of special cases. This work is conducted cooperatively by the Bureau, the Illinois Division of Highways, and the University of Illinois.

FATIGUE STRENGTH OF WELDED JOINTS

The use of arc welding in fabricating steel highway bridges has been hampered by a lack of knowledge of the strength of welded connections when subjected to repeated applications of stress. The fatigue strength of steel, or its resistance to a great number of load applications, is much less than its strength as measured by one load or a few loads, and therefore it is a characteristic of major importance in bridge design. Arrangements have been made for a comprehensive laboratory

study of the fatigue strength of various types of welded joints. In this investigation the Bureau is cooperating with the University of Illinois and the welding research committee of The Engineering Foundation. The tests are to be made at the University.

CEMENTS, AGGREGATES, AND CONCRETE

A laboratory study to determine the effect of using a blend of natural and portland cements on the strength and durability of concrete was completed and a report is being prepared for publication. The report will present the conclusion that, although the crushing and flexural strength of pavement concrete may be slightly reduced by substituting one of the natural cements studied for 14 or 28 percent of portland cement, the resistance of the surface of the pavement to alternate freezing and thawing will be materially increased. Similar tests made with another brand of natural cement of approximately the same chemical composition did not show the same improvement, indicating that the beneficial effect of the natural cement may be influenced by the method of manufacture. Further information along this line will be obtained during the coming year through the inspection of experimental pavements in New York State in which both brands of natural cement have been used.

The extended series of tests to determine the relative efficiencies of different methods of curing concrete were completed and a report is being prepared for publication. Preliminary indications pointing to the importance of applying moisture to the surface of concrete slabs during the early curing period rather than merely sealing the existing moisture within the slab were confirmed.

The Bureau was requested by a committee of the American Society for Testing Materials to cooperate in a series of laboratory tests as part of a study of methods of measuring the soundness of portland cement by the use of a high-pressure steam (autoclave) test. Thirty-five portland cements were tested and the results reported to the committee. In addition, numerous other special tests of cement, all designed to measure properties not revealed by the present standard tests, were investigated. These included methods of determining the bleeding characteristics of cements and various tests to determine the efficiency of the operation of burning the mixture of raw materials in the manufacture of portland cement.

A study of the causes of deterioration of concrete pavements in certain of the Southeastern States indicates the probability that variations in quality of cement not covered by the present specifications may account for at least some of the trouble. In view of this fact, the laboratory studies of cement described above are considered highly important and will be continued.

Work on aggregates has been confined largely to continuation of studies of the Los Angeles abrasion test. Additional data correlating the results of the test with service behavior have been obtained and a report was published. A paper discussing the relation between the results of the Los Angeles test and a special roller test designed to simulate the action of a road roller is in course of preparation.

BITUMINOUS ROAD MATERIALS

Research to determine the significant properties of bituminous materials and aggregates and to correlate those properties with service behavior was continued along the lines followed in previous years. Laboratory tests, performed by commonly accepted methods, were made on materials for (1) compliance with given specifications on routine construction, (2) standardization and perfection of procedure, and (3) determining the suitability of new materials and combinations of materials. Additional tests were also performed on materials and mixtures by methods more recently developed to provide more information on quality and serviceability and to determine the effectiveness of the methods used.

Correlation between laboratory test results and field behavior was attempted by observation of bituminous roads of known characteristics. Differences in service behavior were compared with test results obtained in the laboratory.

Studies of general or special significance, designed to verify accepted theories or to develop additional information on bituminous materials and mixtures, were initiated or continued by the Bureau alone or in cooperation with State highway departments and committees of technical organizations.

Laboratory investigations of the physical and chemical properties of asphaltic materials, tars, and emulsions, and the behavior of surfacing materials containing them, were continued. Changes in refinery procedure and the development of new paving mixtures make a continuation of these studies necessary.

The laboratory examination of asphalt cements in general use throughout the United States was completed, and the data, which are being embodied in a report, will be of considerable assistance in evaluating such changes in specification requirements as are often proposed and in suggesting changes that may be of value in the control of this class of material. This work is to be supplemented by mechanical tests on sand mixtures containing these materials in order to determine more definitely their probable service behavior.

In cooperation with the Minnesota State Highway Department and the University of Minnesota, the laboratory study of asphalts in use in that area was continued. The effect of various aging processes and the value of the various tests in showing the changes that occur in the asphaltic materials and mixtures were studied.

The field and laboratory investigation of sheet-asphalt construction and its service behavior on two projects in the District of Columbia were continued. The changes that occurred during the preparation of the mixtures have been determined, and changes that occur during service will be determined from time to time.

In cooperation with the Ohio Highway Department, a study of the character of the asphalts in old pavements was completed and a report on this investigation is being prepared.

The determination of the absolute viscosity of all grades of bituminous materials was continued. Determinations of the absolute viscosity of a large number of asphalts of 50–60 and 85–100 penetration was completed and a report will be prepared on this work.

A number of bituminous materials and bituminous mixes were subjected to accelerated weathering in a special apparatus.

A study is being made of the microscopic film test to determine its suitability as a specification requirement.

The study to determine the resistance in different bituminous mixtures to stripping of the bituminous films from the particles of aggregate due to the action of moisture is being continued.

The bituminous and nonbituminous joint-filling materials installed on a section of the Mount Vernon Memorial Highway are still under observation. Several new materials, untried but appearing to have promise, were installed.

The experimental roads built in Alabama, North Carolina, Tennessee, and South Carolina, to study the use of cotton fabric in bituminous construction, are under observation and reports of construction, maintenance, and service behavior of similar roads built by a number of States with cotton fabric furnished to them under the cotton diversion program are being received from the States participating.

SUBGRADE INVESTIGATIONS

The Bureau's investigations of subgrade soils and their utilization in highway construction are of a continuous nature and include a number of separate activities. Some of these are closely related, while others are related only in that they have the common objective of improving highway construction through a greater knowledge of the performance of soil materials when used for a variety of purposes.

Application of soil mechanics in the design of foundations for buildings, earth dams, and earth embankments for highways, is receiving much attention. Theoretical analyses of the various problems are being made and much work is being done in the development and interpretation of appropriate laboratory tests. This work has been and will continue to be supplemented by field observations as the opportunities arise. Studies are being made with two devices for making direct tests of shear resistance and with the stabilometer which establishes the relation between the horizontal pressure developed by a soil sample and the vertical pressure to which it is subjected. The data obtained in these tests disclose wide differences in the stress-deformation relations of different cohesive soils. A study is being made of the practical application of shear-test data in the design of structures. A report on the principles of soils mechanics involved in fill construction was published.

Investigations of soil stabilization as applied to fill construction and the construction of road bases continues to be a major activity. Progress was made in the study of the relation between moisture content, density, and stability of soils and a further study is being made of the volume changes of soils that have been compacted under a variety of conditions. Arrangements were made to study fill consolidation and the economic value of the control of moisture and

density in fill construction on three highway-construction jobs. The fills on these jobs will be consolidated by a number of methods, costs will be obtained, and settlements will be observed over a period of years. The projects are located in Indiana, Ohio, and South Carolina, and the experimental work is to be done in cooperation with the respective State highway departments.

Several series of tests of stabilized bases were made on the small circular tracks at the Arlington Experiment Farm. As a result, a report on the influence of grading and plasticity on the performance of sand-clay and sand-clay-gravel bases was prepared for publication. A similar report on the effect of chemicals on the properties of base-course materials and on the use of chert gravels, quarry screenings, etc., is in preparation. The data obtained in these studies have been utilized in the preparation of specifications for materials to be used in base-course construction.

Preliminary to the construction of an experimental road, a study of the use of portland cement as a stabilizing agent in base construction was made on one of the small circular tracks. The experiment in the stabilization of soil with cement will involve the construction of a number of different sections of road in which the proportion of cement and the thickness of the stabilized base will be varied. The experimental road is located in South Carolina and the Bureau is cooperating with the State Highway Department in its construction.

Different agencies use different tests to measure the desired characteristics of stabilized soils and to determine the optimum content of admixtures used for stabilization. The Bureau has started a comprehensive laboratory investigation to study the fundamentals of soil stabilization with admixtures such as bituminous materials and portland cement and to develop and standardize satisfactory test procedures.

For some years the Bureau has furnished to interested laboratories standard check samples of soils for use in the instruction of laboratory personnel and to improve and standardize the technique of testing. The demand for this service continues. An analysis of the test results obtained with these samples by the various laboratories provides information relative to errors in testing procedure and as to the degree of uniformity of results that may be expected when the tests are made by different laboratories in strict accordance with the standard methods. The standard methods of test are being studied constantly in order to improve and simplify them.

The Bureau is cooperating with the Forest Service in a laboratory investigation of the effect of various colloidal materials on the permeability of sandy soils. The purpose is to determine the best method of treating sandy soils used in the construction of earth dams.

Two special 2-week courses of instruction in soil surveying and sampling, soil testing, and soil mechanics were held in Washington. The attendance at both courses was large and was comprised of representatives of Federal bureaus, State highway departments, universities, foreign governments, and commercial organizations.

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